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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O FEBRUARY 24, 1898. CHICAGO, ILL. NUMBER 8

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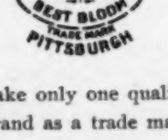

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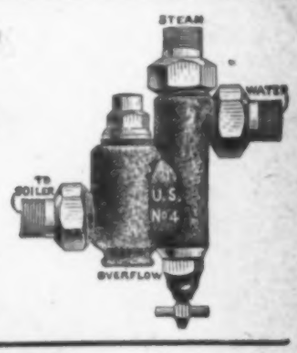

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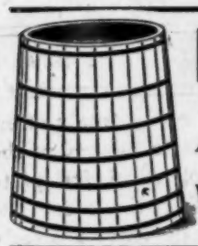

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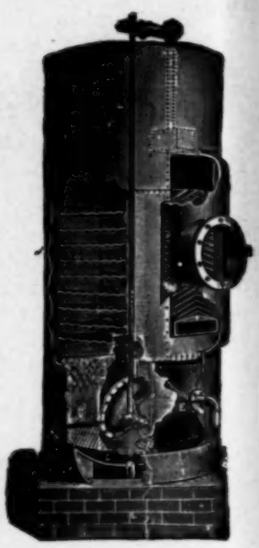

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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. FEBRUARY 24, 1898. CHICAGO, ILL. NUMBER 8

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

While the every-day transactions in the iron trade have not been affected by the stirring international developments of the past week, it is evident that the present uneasiness has produced a hesitancy in some quarters. It is one, though not the sole, occasion of delay in the completion of the wire consolidation. Values are not fully agreed upon as yet, though conferences have been in progress in New York for some days, and the adjustments between appraisers' valuations and those of owners require more time than had been anticipated. Yet these questions are overshadowed by the war talk which temporarily calls a halt on all new undertakings. It may be two weeks, possibly longer, before the underwriters' part in the great deal is performed. It is not to be expected that a transaction involving the payment of twenty millions in cash can be put through while every day brings new alarms. And the fact that all Europe is embroiled in complications that may become serious any week, is particularly apt to set back projects which, like the wire combination, depend for their execution on foreign capital. The month of February, thus far, has shown a letting down from the records of December and January, so far as new business is concerned, though furnace and mill outputs have continued at high-water mark. It would seem that production has been brought to its present height through the general agreement that 1898 will be a year of large business, and early preparation has been made by producers to meet a demand not yet realized. Yet the inquiry in many lines gives indication of the large business just ahead and much of which within a month or two is likely to be found on the order books of the mills. Here and there prices of finished material have yielded a trifle under the wait of the past three weeks. In general, the evenness of the market since Dec. 1, under the enormous consumption going on in all lines is practically without a parallel in the history of the trade. A further meeting of Southern pig iron producers is being held this week. It is believed some betterment in prices on Southern irons will come out of it, but there are objections to overcome, to the plan of a commission to have oversight of sales and to enforce any agreement the furnace companies may make as to prices. The market for foundry irons is inactive, but the furnaces are not pressing matters, most of them being easy as regards orders, and shipping steadily. Some sales of Bessemer pig iron have been made at $9.50, valley furnace, for February and March, and at $9.75 for second quarter. Some inquiry is being made for iron for the third quarter, but sellers are not interested. Steel billets hold to the recent advance, and $15.25 is minimum with most Pittsburg mills. Some business is being done in sheet and tin plate bars for third quarter, tin plate mills freely offering their product for delivery close to the end of the year. Business is rather less plentiful for plate mills. For shapes there is a good outlook for the spring, and bridge business is supplying a steady tonnage. Bar mills, though operated on a larger scale than for years, are not so well sold ahead as other lines appear to be, and prices are in the old rut.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
507 TRADESMEN'S BUILDING, Feb. 23.

For two weeks there has been a lull in buying of finished material and unless a reaction comes February will compare very unfavorably with December and January. A strong inquiry helps the situation and the spring outlook becomes better daily. Rod combine developments are again the center of interest, and it is said by interested persons that the consummation of the scheme may be expected in a short time.

PIG IRON.—Bessemer pig iron has not changed noticeably in 10 days, but the situation is being closely watched. Inquiries were made last week by some of the large buyers ostensibly for third quarter deliveries but no buying resulted. A sale of 10,000 tons for Pittsburg delivery was made through a Pittsburg dealer's office, at a price somewhat below present furnace quotations. For prompt iron, $9.50 to $9.65 valley continues to hold and $9.75 to $10 is the range of quotations on shipments running to July. Some business has been done at the former figure. Foundry irons are stronger and gray forge inactive. Current quotations are:

Bessemer, first quarter valley	$ 9.50 to $ 9.65
Bessemer Pittsburg	10 15 to 10.35
No. 1 Foundry	10.40 to 10.50
No. 2 Foundry	10.00 to 10.15
No. 3 Foundry	9.50 to 9.75
Gray Forge	9.00 to 9.10

BILLETS.—On new business steel mills are holding firmly for $15.25 at mill. Two local mills at least are filled for two of three months and these ask $15.50 at mill. Wheeling and valley quotations are $15, mill.

SHEET BARS.—Sheet bars are quoted at $17, and are firmer than a week ago.

RODS.—Local leaders in the rod pool movement have been in New York for some days closing up valuation questions, and in other ways perfecting the organization. A little time may yet elapse before the completion of the deal. Rods are scarce and selling at $23 and $23.50. A sale of 1,000 tons is reported at $22.75, mill.

STRUCTURAL MATERIAL.—The contract for the local Kaufman building, requiring 1,000 tons of shapes, has been placed and steel ordered of a Pittsburg mill during the week. Agreed prices on shapes are quoted as follows f. o. b. mill: Beams, 3 to 15 inches, 1.15c; 18 to 24 inches, 1.25c; zees, 1.15c; tees, 1.20c. Universal plates in connection with other shapes are selling as low as 1c; alone 1.10c.

PLATES.—Orders for 650 steel cars have been placed this week with the Shoen Pressed Steel Co., and on these about 8,000 tons of plates are needed for sides and bottoms and, in addition, open-hearth steel for trucks and axles. On previous orders for steel cars material has come from Pittsburg mills, the last one being let but two weeks ago. Plates in general have been in little demand for two weeks past and the month's tonnage so far is much behind January. Mills quote: Bessemer and open-hearth tank, 1c; shell, 1.10c; flange, 1.20c.

RAILS.—Rails are quoted at $18, Bessemer and track material as follows: Iron track bolts, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c; splice bars, 1.10c to 1.15c; links and pins, 1.20c.

IRON AND STEEL SKELP.—Skelp quotations continue on the following basis. On one or two descriptions of skelp lower figures have been made: Grooved steel skelp, 90c to 95c; sheared steel skelp, 1c to 1.07½c; grooved iron skelp, 1.05c to 1.10c; sheared iron skelp, 1.12½c to 1.15c.

SHEETS.—Buyers in the last 10 days have found that most of the sheet mills are booked for three months ahead on light gauges and are holding heavy gauges higher than a week ago. Some of the business already taken was on a basis of 2.05c for No. 28, and this price is now asked by the better fixed mills. From others, however, a 2c base is possible and where heavy gauges are needed they are relatively weaker. Galvanized sheets are quoted at 80 and 7½ per cent off and black sheets for tinning at $2.20.

PIPES AND TUBES.—For two weeks there has been a lull in pipe business and buying has been below the rate of the last two months. The situation is helped materially by a good inquiry on spring business and by fairly steady prices. Base discounts are as follows: Butt weld, black, 57 per cent off; lap weld, black, 67 per cent off; butt weld, galvanized, 50 per cent off; lap weld, galvanized, 55 per cent off. The additional discounts are 6 tens and 5 per cent on small lots and 6 tens and 7½ per cent on attractive orders Discounts on merchant boiler tubes are as follows: 2¼ inch an smaller, 72½ per cent off; 2½ inch and larger, 75 per cent off.

FERRO-MANGANESE.—Domestic 80 per cent ferro-manganese is quoted at $47 and $47 50.

SPELTER.—Spelter is quoted at 3.85c and 3.90c.

OLD MATERIAL.—Recent sales of scrap are reported on a basis of $10.50 for steel rails, $10 for car wheels, $9 25 gross for cast scrap, $11.50 for No. 1 wrought, $10.15 for busheling scrap, and $13.75 for old iron rails. A good inquiry is reported.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1141 MONADNOCK BLOCK, Feb. 23.

With the furnaces and most of the mills in this district so well sold up as they are, there are no special developments concerning new business. Sales of nearly all classes of material have been good, and the new tonnage last week kept up the average for February. Most of the business was in comparatively small lots, the largest sale being one of something over 6,000 tons of Lake Superior charcoal pig iron. Prices have changed very little. Those on local pig irons have been advanced 50 cents a ton. The prices quoted on some forms of steel could be shaded quite a little for good specifications.

PIG IRON.—The largest sale of the week was one of over 6,000 tons of Lake Superior charcoal iron, which was made by the Spring Lake furnace to the Oliver interests at South Bend This, it is said, was made at under $11 a ton. Some other business has been transacted in Lake Superior charcoal, and the furnaces appear to have difficulty in getting the full quotations for their iron. Local coke irons have had only a small sale, comparatively. The furnaces appear to be more anxious to fill their present business than to take more. The consumers, too, appear to have satisfied the requirements for a considerable time into the future. The furnaces report that buyers are taking their iron as fast as it was contracted for, and in many cases much faster The malleable interests are particularly full of work. Southern interests have had a good week, with one or two quite large sales. The largest was one of 2.000 tons. The inquiry for 6.000 tons of iron, reported some time ago, developed into an order for 1.500 tons, two thirds of it going to a local furnace, and the balance to the South. The quotations on Northern irons were advanced 50 cents a ton last week, and are now on a basis of $11 for No. 2 foundry. The Southern producers and their sales agents are holding a meeting at Birmingham this week, to close the arrangement to hold to prices, if possible. It is quite likely that if any arrangement is made, it will be on the basis mentioned in this column last week, of a commissionership for regulating the sales, prices and tonnage. We revise our quotations as follows:

Lake Sup. Charcoal	$11 50@ 2 50	South'n Coke No. 3	$10 10@10 35
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 1 Soft	10 60@10 85
Local Coke Fdy. No. 2	11 0 @11 50	Southern No. 2 Soft	10 35@10 85
Local Coke Fdy. No. 3	10 75@11 00	South'n Silveries	11 25@11 50
Local Scotch Fdy. No. 1	11 50@12 00	Jackson Co. Silveries	14 50@14 50
Local Scotch Fdy. No. 2	11 0 @11 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 75@11 00	Alabama Car Wheel	14 00@16 00
South'n Coke No. 1	10 60@10 85	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 35@10 85	Coke Bessemer	11 50@12 00

BARS.—It is reported that some of the nearby mills have had difficulty in getting sufficient scrap to make the bars for which they have orders; yet the scrap shortage has not strengthened the market. Bars are selling at present fully as low as in recent weeks, and late sales are reported under our quotations. Business has been fairly good, but in the main consisting of lots below 200 tons. The demand for small lots is good, and sales are expected to continue on about the same basis for some time. Quotations are made at 1.05c to 1.10c for common iron, 1.10c to 1.15c for guaranteed iron, and 1.10c to 1.15c for soft steel bars from strictly billet stock.

CAR ORDERS.—It is reported that the B. & O. is figuring on placing an order for 5,155 cars, and has asked for prices from some of the car works. Aside from this there is little figuring in a large way.

RAILS AND TRACK SUPPLIES.—In the present well sold condition of the local mills, they can take very few orders for delivery before mid-summer. Quotations are unchanged, as follows: Rails, $20 to $22.50, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.60c to 1.65c.

BILLETS AND RODS.—The local mills have taken no orders in the week, and outside mills have not done much. The market appears to be firm at $17.50 for billets and $24.50 for rods.

STRUCTURAL MATERIAL.—The Conkey building, at Hammond, Ind., was placed last week, taking about 350 tons of material. The Tosetti building, in this city, took about the same tonnage. No other structural business has come up. Considerable bridge work is being placed all the time, and orders fro such material last week were slightly above what they have been in the past two or three weeks. The C. & N. W. road gave a contract for about 500 tons of material for ore chutes at Duluth. Quotations are made as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.15c to 1.25c; plates, 1.10c to 1.15c; tees, 1.35c to 1.40c. Small lots from stock are quoted at one-quarter to one-half cent higher.

PLATES.—Quite a good business has been done in tank plates, most of it in small orders, with one or two of good size. The inquiry indicates good business for the future. Recent sales have been made at something under our quotations, and orders of good specifications could undoubtedly be placed at lower figures. The market on plates is not at all a strong one. Prices are as follows: Tank steel, 1.10c to 1.15c; flange steel, 1.40c to 1.45c; fire box steel, 1.85c to 5c.

SHEETS.—There has been a good business in both black and galvanized sheets, and the demand shows no signs of falling off. Several contracts for round lots have been placed in the week. Quotations are made at 2.15c to 2.20c for No. 27 black, and 80 and 7½ to 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—Transactions have been of good volume, and included several orders of large size. The demand keeps up well, and dealers are looking for a good spring business. Prices follow: Open-hearth spring, tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.45c to1 50c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—The markhet is very quiet as far as sales go. No large business has been done, and there are no important inquiries in the market. There is still a shortage in cast scrap; it is reported too, that some of the bar mills have been unable to fill their requirements. Quotations are revised as follows:

Old iron rails, gross	$12 50@$13 00	Axles, net	$14 25@$14 75
Old steel rails, long gr	10 50@ 11 00	Cast borings, net	4 00@ 4 25
Old steel rails, short	9 25@ 9 50	Wrought turnings, net	5 50@ 6 00
Old wheels, gross	11 00@ 11 50	Axle turnings, net	7 25@ 7 50
Railroad forge, net	12 00@ 12 50	Mixed steel, gross	7 25@ 7 50
Dealer's forge, net	10 50@ 11 00	Stove plates, net	6 00@ 6 25
No. 1 mill, net	7 50@ 8 00	Heavy melting steel gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net	13 25@ 13 50
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

Office of *The Iron Trade Review*,
27 Vincent St., Feb. 23.

Though no sales of 1898 ores are announced outside of the Mesabi complement of the Illinois Steel Co., it is understood that certain furnacemen are ready to make arrangements for the bulk of their Bessemer supplies as soon as the computations on old-range ores are completed. It is expected that a meeting in the latter part of this week will put the schedules in final shape. Two questions of some interest to the trade

just now are: What prices will Mesabi ores bring, relative to those of 1897, and what quantity of old-range ores will the leading Pittsburg company take? Mesabi asking prices will be above the basis of last year; the advance made in old-range Bessemers, at least, will be expected by the producers there whose product goes on the open market. They are certain that their ores, on their merits, are entitled to more than this; but against these considerations are two influential ones: The supply is great and the demand is limited. Last year, panic seemed to overtake some Mesabi sellers just at the time in which a little steady holding on would have tided over the strain. Whether the same precipitancy to sell will be seen this year will develop within the next month or so. As to the other question: It is foregone that the shipments from the Oliver Mining Co.'s properties will be approximately double those of 1897. The Mesabi shipments, in view of the limitations on the use of these ores established by 1897 practice, are not likely to exceed those of last year. The probabilities are that upwards of 750,000 tons of old-range ores will be bought; the amount may run 100,000 to 200,00 tons above this.

PIG IRON.—Buying of Bessemer iron has been freer in the past week than in the week immediately following the big transactions. Sales of lots from 1,000 to 3 000 tons for February delivery have been made at $9.50 and $9.55 valley furnace. Some little activity is noted also in second quarter iron, and sales are reported at $9.75, valley furnace. The destination of the April, May and June iron is not known, purchases being made through dealers. The possibility of further needs by producing interests is not a remote one, and causes furnaces to hold quite firmly for quoted prices. Some producers who will carry over but little 1897 ore are disposed to stand for $10 on deliveries beyond May. The foundry iron market is quiet. Consumption is at a good rate in the Central West, but buyers seem confident of steady prices, though the indications in the past week have been for an advance by Southern sellers, and if the Bessemer market holds up, furnaces alternating between Bessemer and foundry iron will stay out of the latter field. The amount of Lake Superior charcoal iron absorbed at the low prices is growing. We quote f. o. b. Cleveland:

Bessemer	10 15@10 40	Valley Scotch No. 1	$10 40@10 65
No. 1 Strong Foundry	10 40	Valley Scotch No. 2	9 90@10 15
No. 2 Strong Foundry	9 90	Gray Forge	9 00
No. 3 Foundry	9 40@ 9 50	Lake Superior Charcoal	11 50

FINISHED MATERIAL.—Mills are still making large outputs, but in some parts of the market, particularly in wire and wire nails, demand at the moment is only moderate. Buyers are waiting; but meantime prices are maintained at $1.25 for smooth wire and $1.45 for wire nails. The meeting at Pittsburg, Feb. 24, will determine whether the original understanding as to a $1.50 basis in March will be carried out in view of the present waiting tendency. Tin plate and sheet mills have booked a fair tonnage. Three Northern Ohio tin plate mills are in the market for tin plate bars, for third quarter—an aggregate of 13,000 tons. The market is in the neighborhood of $17.25, Cleveland. Bridge work furnishes steady demand, a 600-ton order having been placed the past week, while one for 500 tons is pending. Bars have sold in lots up to 200 tons at unchanged prices, the Pittsburg basis of 1c for steel being maintained by some mills, and cut $1 a ton by others. Valley mills quote 95c to 1c in the valley for iron. Sheets are a trifle firmer at 2.10c for No. 28, and heavy gauges are quoted higher by mills that have been fortunate in filling up recently. Of old material, cast and wrought scrap are in best demand. We quote cast scrap at $8.25 to $8.50; No. 1 railroad wrought at $11.75; old iron rails, $13.75; old steel rails, $10.50.

CINCINNATI.

February 22.

Reports last week from Birmingham of an impending war between furnaces were without foundation. A great deal of attention is naturally being directed to the meetings Southern iron masters are holding in Birmingham. For two weeks now they have met and discussed the general situation and this week their final session is held. It is announced in advance that a satisfactory agreement has been reached regarding a harmonious understanding between the Southern iron producers which will have the effect of maintaining prices and stopping the disastrous cutting which has so long been a feature of the trade. The result of this meeting in definite terms will probably not be known until the end of the week. While there is a very fair run of small orders yet there is nothing doing of any considerable moment in the Southern iron trade. A few 500-ton lots have been booked, but the majority of the orders are for car load lots. Prices are unchanged. Nearly all sellers have reached bed rock, and volume of business cannot be increased by further sacrifices. In Lake Superior charcoals the tendency is in direction of recovery from the ruinous prices that have been made. Stocks have been greatly reduced; old consumers of this material induced to put it in their mixtures again and prospects are good for much larger use than during 1897. We quote for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $9.75; No. 2, $9.50; No. 3, $9.25; gray forge, $8.75; mottled, $8.75; No. 1 soft, $9.75 to $10; No. 2, $9 50 to $9.75; Belfont coke, No. 1, Lake Superior, $11 to 11.50; Belfont coke, No. 2, Lake Superior, $10.50 to $10.75; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson Co. silvery, No. 1, $12.50 to $13; Standard Georgia car wheel, $14.25 to $15.

BUFFALO.

February 23.

Malleable and car wheel iron continues to be the center of attraction for most buyers. Several sales have been made at very low figures. The gray iron foundry market in this vicinity has not yet felt the effects of the advance in Bessemer and the stiffening of prices of foundry iron elsewhere. At the same time, the market is firm on the following basis, cash f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $11 to $11.25; No. 2 strong foundry coke iron, Lake Superior ore, $10.50 to $10.75; Ohio strong softener No. 1, $11.50 to $11.75; Ohio strong softener No. 2, $11 to $11.25; Jackson Co. silvery, No. 1, $14; Southern soft, No. 1, $11.50 to $11.75; Southern soft No. 2, $11.15 to $11.35; Lake Superior charcoal, $11.50.

More Orders for Steel Cars.

The steel car is apparently beyond the experimental stage. The Schoen Pressed Steel Co., of Pittsburg, has on its books orders for 1,190 steel cars to be delivered by June 1. Of these 400 are for the Pittsburg, Bessemer & Lake Erie Railroad, and 100 for the Pittsburg & Lake Erie. The latest orders were those of the Pittsburg & Western for 450 cars and the Pennsylvania Railroad for 200.

The cars for the Pittsburg & Western road are similar to those now used on the Bessemer line, but longer, heavier and stronger. They are 30 feet long, 105 inches high from the top of the rail, with a bed over six feet high, and each weighing 33,000 pounds empty. Carnegie open-hearth steel will be used in the axles. Each car is designed to carry a coal load of 90,000 pounds and ore load of 110,000 pounds. The sides will be of quarter-inch plates, and the bottoms and angles much thicker. These cars will be used between the Pittsburg and Mahoning Valley furnaces and the Fairport dock, on Lake Erie. It is estimated that trains of 40 cars can be easily handled by the heavy engines in use. The 200 cars ordered by the Pennsylvania lines will be the largest and strongest cars. They will be similar in design to the Bessemer cars, except that they will be 32 feet long and 10 feet high above the rail. They will each weigh 35,000 pounds and are designed to carry 100,000 pounds of coal and 110,000 pounds of ore.

Extensive improvements are being made at the Allegheny plant of the Schoen Pressed Steel Co., and the present capacity is to be very much enlarged.

THE date fixed by the National Association of Manufacturers for the opening of the sample warehouse which the association has established in the city of Caracas, Venezuela, is March 26. Some of the members of the association who have placed samples of their goods in the warehouse have signified their intention to join an excursion party, for which arrangements are now being made, to be present at the opening and to make a short trip through Venezuela, visiting the principal points of interest. The programme arranged for the tour provides for entertainment and opportunity to study the country.

THE IRON TRADE REVIEW

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FEBRUARY 24, 1898.

PRESENT ECONOMIC TENDENCIES.

Two recent articles on parallel lines reflect the current thought of students of economic problems, concerning the rapid pace of industrial changes. One is contributed by Andrew Carnegie to the last *Nineteenth Century* under the title, "The Manchester School and To-day." The second is an editorial in the *Engineering News* on "The Distribution of Manufacturing Industries." Mr. Carnegie shows that the policy of Cobden and Bright made England the world's workshop for more than a generation. The producers of foods and of raw materials pouring in their products without restriction, gave English artisans the cheapest food and English manufacturers the cheapest materials, which being worked up were sold, in conformity with the Cobden maxim, "in the dearest market." The breaking down of the traditional British policy comes, as Mr. Carnegie views it, from the growing unwillingness of the balance of the world to be content with sending raw materials to Great Britain, and the failure of the latter in turn, to limit her free trade policy to such materials. Free food and free raw products, he says, is still sound, but free entry to foreign manufactures is no longer a winning policy. France, Germany, Belgium, Switzerland, are working up their own raw materials, not to mention the important developments in Russia. In China and Japan, moreover, there is growing recognition of the possibilities of automatic machinery, as an offset to the advantages so long possessed by England's skilled artisanship. Greatest factor of all is the prominence of the United States in international trade, taking from Germany so soon, the prestige which the latter had wrested from Great Britain. And yet Mr. Carnegie is willing to believe that the great advantage Mesabi ores have given the United States may pass in turn to another country, through new developments, possibly to Russia. The era seems to be close at hand, he suggests, when every country will carry its own raw materials along into various lines of manufacture and when each nation's exports to others will consist largely of those products in which it especially excels.

Automatic machinery is the great agent of the industrial revolution that has now attained such momentum among the nations. The United States, as peculiarly the home of the labor-saving appliance, is bound to reap for the next few years, at least, we believe, possibly for a decade or a generation, the great harvest for which it has been preparing in the past 20 years. The renovation of American workshops, the discarding of the outdated, and the introduction of machinery whose displacement of hand labor is highest — has been going on at a rate scarcely appreciated. In getting ready for the severer struggle at home that was forced upon them by the great falling off in domestic trade, our manufacturers have been preparing for the larger contests, into which they are entering with such alacrity.

What the writer in *Engineering News* says in the article mentioned above is pertinent in this connection. Referring, as Mr. Carnegie does, to the ambition of other nations to develop their own resources and achieve commercial as well as political independence, as a chief cause of Great Britain's industrial anxieties, he says the United States need not expect permanently to supply European nations with any goods which their own natural resources will permit them to make. "Our automatic tools," he adds, "may for a time enable us to win a trade in certain lines; but European manufacturers will eventually buy the tools that will enable them to make the machines or products themselves. In the countries of South America, Asia and Africa, however, the building up of manufacturing industries will be a slower and longer task; and such of their trade as we may secure, we may reasonably expect to hold for many years."

Such changes in the positions of the nations, and particularly such awakenings in Oriental countries, as have surprised us in the past two or three years make one chary of prophecy. It is true that the invention of automatic machinery, in which this country has led, has put into the hands of countries having little skilled labor, the means of producting articles heretofore requiring a high degree of skill. Yet the race will not be to the feeble imitators. It is to be expected that where invention has gone farthest, it will still be active in keeping a supremacy once attained. The possibilities of world-wide trade are measureless from to-day's standpoint. No estimate can be made of the new wants created and to be created among peoples whom civilization is now just beginning to touch. As life in these new markets grows out of its simplicity and new desires come out of increasing contact with progressive nations, the effect upon trade will be marked. And here come in considerations that have a direct bearing upon the problem of labor-saving machinery, that has given some economic writers concern. With the growing tendency to bring together the factory and the raw materials, costs of production will still be lessened and with cheapening will come wider and wider use. There is food for thought here for those who now and again ask where all the

tremendous iron production of the United States is to be put.

INWARD AND OUTWARD MOVEMENT OF IRON.

Pride is pardonable in a review of our iron and steel exports for 1897. The December statistics are just published in detail by the Treasury Department and the footings for the last calendar year are available. What has been done in exports of pig iron, steel rails, steel bars, wire, and other material, has been published from time to time through the year; but the total is a gratifying surprise, when set deside that for 1896, which was marked by the beginning of this interesting outward movement. It will be seen from the table below that in 1897 the tonnage of the iron and steel products specified was three times the total for 1896—616,000 tons against 210,000. The figures tell their own story, though the record is made somewhat obscure by the fact that new classifications have been introduced, and these have been in use for but half of 1897. In the case of tin plates, no report of the small exportation has been attempted before December, 1897, the amount for that month being 4,144 lbs.:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	December.		Jan.—Dec.	
	1896.	1897.	1896.	1897.
Pig iron { ferro / all other }	17,335	{ 533 / 25,651	62,071	{ 5,185 / 257,501
Scrap	61	4,126	1,290	42,469
Bar iron	250	312	3,505	4,493
Steel bars (not wire rods.)	1,448	1,111	8,600	39,165
Iron rails	50	100	628	5,413
Steel rails	10,925	14,118	72,503	142,787
Billets, ingots and blooms	(a)	2,036	(a)	6,356
Hoop, band and scroll iron	.....	126	265	1,424
Wire rods	(a)	501	(a)	10,261
Iron sheets and plates	149	132	771	4,045
Steel sheets and plates	1,033	1,116	1,850	5,815
Tin plates, terne plates, and tagger's tin	(b)	2	(b)	b2
Structural material	(a)	2,031	(a)	a15,072
Wire	5,159	4,566	38,043	53,297
Cut nails	868	105	10,588	14,127
Wire nails, / Other, including tacks }	711	{ 433 / 126	10,225	{ 5,794 / 3,167
	37,989	57,125	210,339	616,374

(a) Not separately stated prior to July, 1897.
(b) Not separately stated prior to December, 1897.

Interesting by contrast is the statement of iron and steel imports for 1896 and 1897, as given below. It will be seen that the falling off is 107,000 tons, or more than 40 per cent. The great shrinkage is in tin plates, and next to that in pig iron:

IRON AND STEEL IMPORTS TO THE UNITED STATES.—GROSS TONS.

	December.		Jan.—Dec.	
	1896.	1897.	1896.	1897.
Pig iron	970	2,885	56,272	19,212
Scrap iron and steel	316	159	8,259	1,549
Bar iron	1,012	1,454	16,276	13,995
Iron and steel rails	.....	31	7,796	415
Hoops and band iron	.....	.....	26	28
Ingots, blooms, etc	947	1,266	20,356	17,233
Sheets and plates	252	124	6,497	2,614
Cotton ties	10	.....	6,786	105
Tin plates	5,510	7,526	119,171	83,851
Wire rods	1,643	1,914	18,977	16,415
Wire	220	248	3,674	3,554
	10,880	15,637	264,081	157,971

The iron ore imports for 1897 were 489,970 tons, as compared with 682,806 tons in 1896. Some further idea is obtained, of the great change that has been wrought in the iron and steel trade balance in the past year, by turning to the valuations. The enumeration of exports above leaves out machinery, car wheels, miscellaneous castings, safes, stoves, pipe, and a miscellaneous item of "other manufactures of iron and steel." The total value of iron and steel exports in 1897, including these various forms of iron and steel products was $62,737,687, as against $48,670,218 in 1896. The imports of iron and steel last year were worth $13,835,950, leaving a favorable trade balance in iron and steel of $49,000,000. This is altogether apart from $5,302,807 worth of agricultural implements, and $10,061,118 worth of cars and carriages, including bicycles, much of both which items should go to the credit of our iron and steel industry.

UNLESS the Cuban situation should become critical or the foreign outlook from an English standpoint grow rapidly more threatening, it is now expected that the wire combination will be perfected, on the original lines; but two or three weeks more may elapse before details are closed up. It is stated that a round $20,000,000 in cash is to be paid out for properties taken up by the American Steel & Wire Co. Some plants, as with the New Castle Wire Nail Co., and the Salem Wire Nail Co., are to be bought outright; in the case of all the others the terms are part cash and part stock in the new company.

PERSONAL.

Superintendent William McConnell, of the open-hearth department of the Homestead Steel Works, has resigned to accept the superintendency of the Buhl Steel Co.'s plant at Sharon, Pa.

President Charles M. Schwab, of the Carnegie Steel Co., Ltd., sailed from Liverpool early in the week, and will arrive in New York on the 26th.

L. W. Bowman, a supervisor at the armor plate plant of the Carnegie Steel Co., Ltd., at Homestead, left last Saturday for St. Petersburg, Russia, to prepare the plans for the armor plate contracted for by the Russian government. Mr. Bowman made a trip to Russia in connection with the last armor plate contract with Russia executed at Homestead. It is noteworthy that while $500 a ton is paid by Russia for the armor just purchased for the Russian navy, there are congressmen who have tried to establish $300 as the price of armor delivered to the United States Government. The superiority of American armor plate and its relative cheapness are well appreciated by other nations.

W. Janson, assistant to P. T. Berg, mechanical engineer of the Homestead Steel Works, has resigned to accept a position in the mechanical engineering department of the Iron and Steel Association of Sweden.

F. A. Emmerton, of Cleveland, has spent the past month in the exploration of marl beds in Southern Michigan.

Ambrose Baird, Jr., formerly of Cambridge, O., has been appointed general superintendent of the Star Tin Plate Co., of Pittsburg.

Joseph Robinson has resigned as manager of the Buhl Steel Co.'s Mill, at Sharon, Pa., and C. Hart, of Philadelphia, succeeds him.

W. R. Webster, of Philadelphia, has just returned from a stay of several months in Japan. Mr. Webster represents the Japanese government as purchasing agent in the United States.

Reese James, superintendent of the converting department of the Homestead Steel Works, has been appointed superintendent of the open-hearth department of the plant to succeed Nevin McConnell, who goes to the Buhl Steel Works, at Sharon.

J. H. Watt, superintendent of the Carrie furnaces, at Rankin, resigns his position March 1. He will be succeeded by G. M. Hamfeldt, of Troy, N. Y.

DRAKE, BATES & Co., Cleveland, have just taken the sales agency for Brotherton ore. It is expected that the Brotherton will produce about 100,000 tons in 1898. The ore runs close to 63 per cent in iron, .037 in phosphorus, 7.05 in silica, .46 in manganese and 1.10 in alumina. Another sales agency change is announced, also. The Adams ore, heretofore sold by Tod, Stambaugh & Co., will be handled by Oglebay, Norton & Co., who are now sales agents for all the ores of the Lake Superior Consolidated Iron Mines.

MOST MODERN OF LAKE SHIP YARDS.

The fact that at the new ship yard and dry dock at Lorain, O., completed recently by the Cleveland Ship Building Co., the use of electricity and compressed air has been provided for to an unusual extent, makes some details of the plant of particular interest. The work of construction began Feb. 22, 1897; in 11 months the dry dock was occupied, and work was under way in all parts of the plant. The plans and specifications were made by Mr. James Ritchie, the well-known Cleveland engineer, who also superintended the work of construction.

To give some idea of the scale of operations at Lorain we present in Fig. 1 a view showing the arrangement of the yards and dock and of the various buildings. The dry dock is about half a mile from the harbor entrance. Black River is about 400 feet wide at this point, and 25 feet deep, and a bend at the Ship Building Co.'s plant makes it easy for vessels to enter the dock and slips. The length of the dry dock is 560 feet; the width on top, 96 feet clear, and the width on the bottom, 59 feet. It is the longest dock on the lakes. The steel gate is 60 feet on the bottom and 66 feet at the top between jambs. At the ordinary stage, the depth of water is 17 feet on the sills and 20 feet on the floor of the dock.

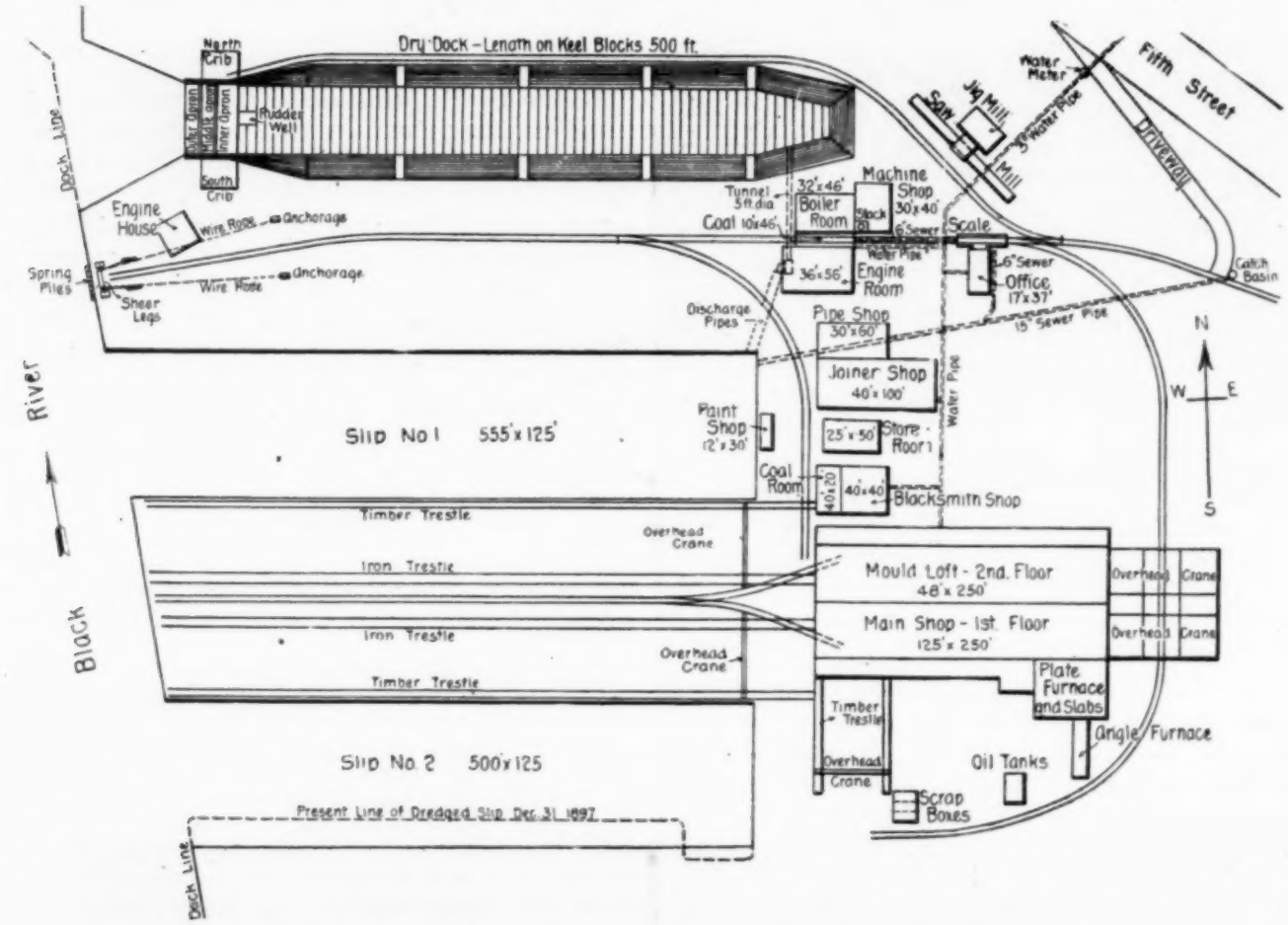


FIG. 1.—PLAN OF THE CLEVELAND SHIP BUILDING CO.'S PLANT AT LORAIN, O.

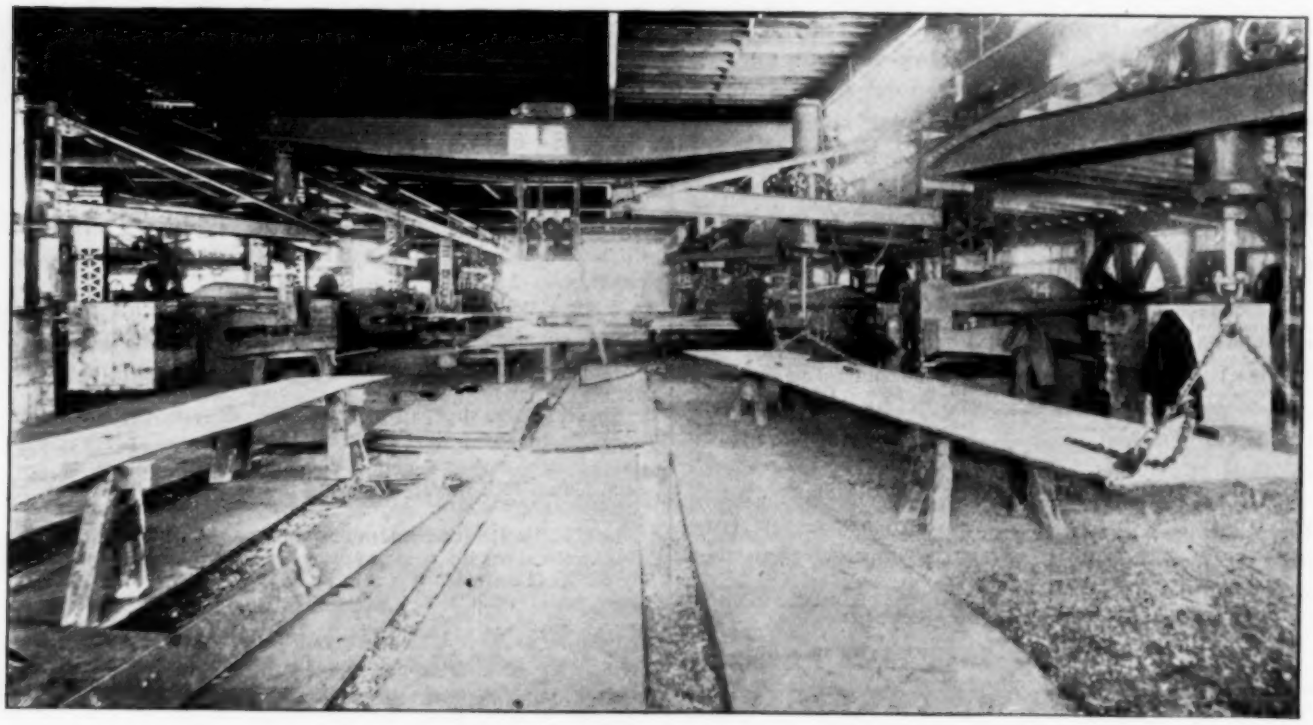


FIG. 2.—VIEW IN MAIN SHOP.—CRANE SPAN, 40 FEET.

The Main Shop.

The portion of the plant which we have selected for special illustration is the main shop, which is 125x250 feet. The mold loft extending over a portion of the building, 250 feet long and 48 feet wide, in which lines of vessels are laid out and patterns prepared, is indicated in the sectional view in Fig. 5. There is ample light, the ends of the shop being

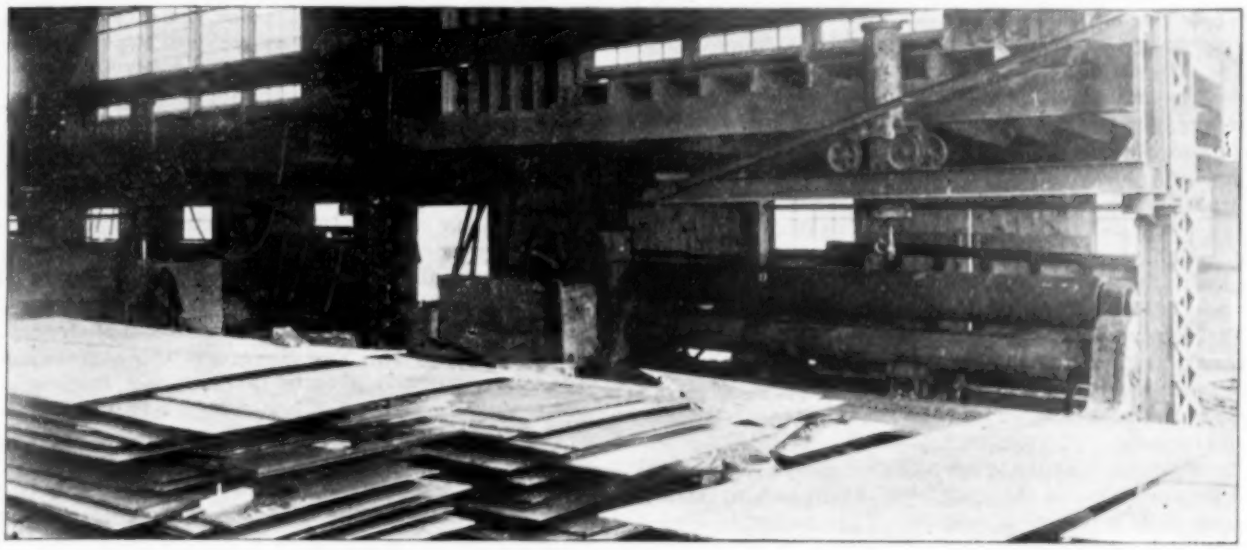


FIG 3.—VIEW AT END OF MAIN SHOP, SHOWING 18-FT. BENDING ROLLS.

open, while side windows in the wings and in the main structure are large. The traveling crane equipment within consists of two electric cranes, built by the Morgan Engineering Co., of Alliance, O., each of 7 tons lift and 40 foot span. As shown in Fig. 3 the girders on which the cranes run extend into the yard and the traveler is thus used for unloading plates from cars and transferring them to the tools for bending, punching, etc. At the other end of the shop, after the plates have passed through the various operations, in order, from the flanging rolls and punches to the planers, they are deposited on low cars, which need to be pushed but a few feet into the yard to come underneath the high electric cranes, which command the berths. There are two of these, of 10 tons capacity and 58 feet span, built by the Brown Hoisting & Conveying Machine Co., of Cleveland. They handle and place practically all the material that enters into the construction of the vessels. At present two steel freighters are under construction, one the Wolvin boat, 450 feet over all, and the other the new vessel for the Cleveland-Cliffs Iron Co.'s fleet, 426 feet long.

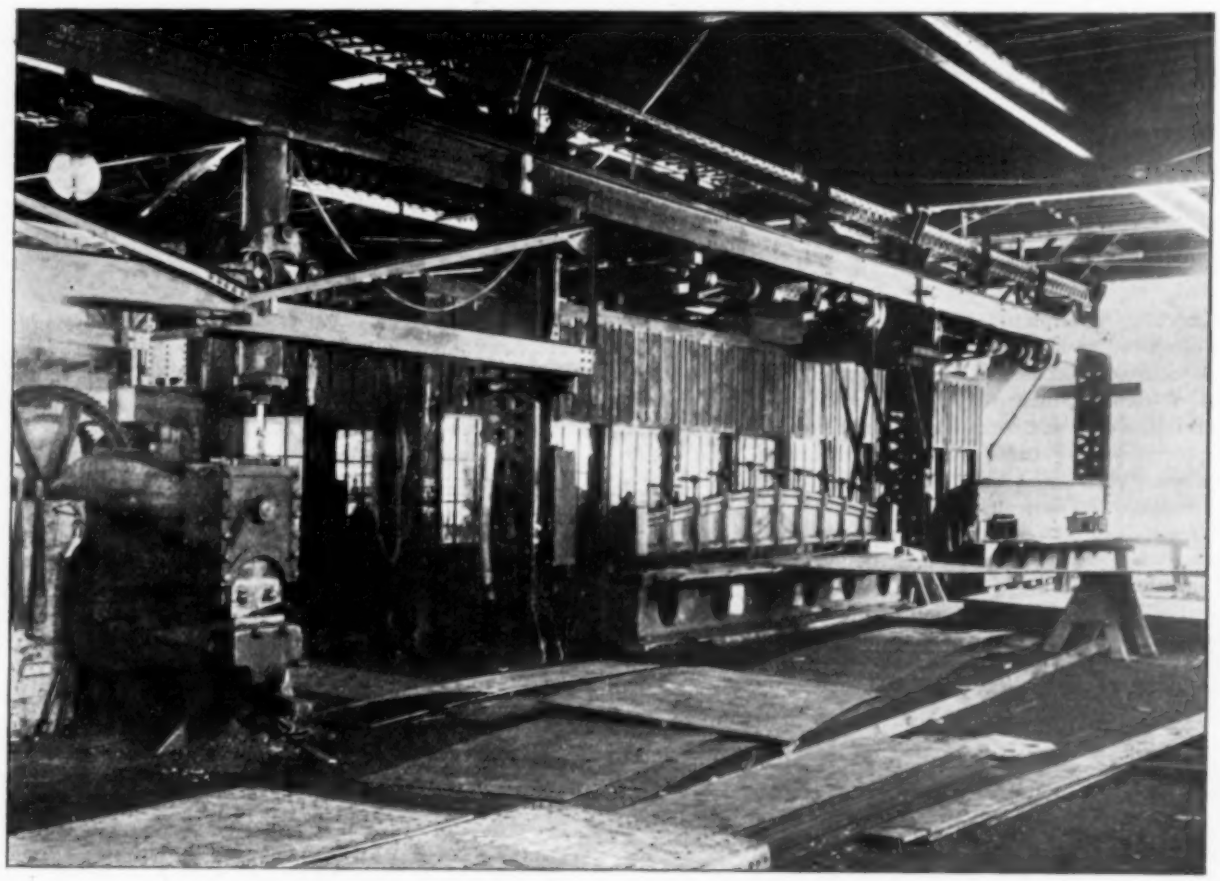


FIG. 4.—VIEW IN MAIN SHOP, LOOKING TOWARD SHIP YARD BERTHS.

Electric and Pneumatic Equipment.

An interesting feature of the equipment in the big shop, as will be noticed in Fig. 2, is the liberal use of pneumatic hoists for the handling of plates. There are 24 Pedrick & Ayer air lifts, each mounted on a jib-crane run-way, the cranes being so disposed that all the tools are readily served with a minimum of hand labor. The compressed air supply is furnished by a compressor of the Rand duplex type, having a capacity of 1,600 cu. ft. The steam cylinders are 14 inches by 22 inches, and the air cylinders 22 inches by 14 inches, low pressure, and

14 inches by 22 inches high pressure. Besides operating the pneumatic hoists, compressed air is used for driving rivets on the frame work of vessels, also flush rivets on plates, reaming holes for rivets, chipping and caulking seams, operating pneumatic-hydraulic stationary riveters, drilling out countersunk rivet heads, and operating portable drills.

The electrical machinery in detail is as follows: One 100-k. w. 220-v. compound wound generator; one 30-h. p. mill-type motor for bending rolls; 22 enclosed type shunt-wound motors of varying capacities.—five 2-h. p., eight 3-h. p., three 4-h. p., one 5-h. p., two 10-h. p., one 15-h. p., one 20-h. p., one 40-h. p., all 220-v. In all of the above motors the field coils, armatures and commutators are entirely protected from dust or careless handling. Each motor has an automatic safety and limit switch with resistance of the card make, and all are set for an overload of 25 per cent. They are entirely fireproof and well protected against dust or small particles of iron. All have self-oiling bearings and are large and well adapted to the severe usage to which they are subjected in the class of work done at such plants. Some of the motors on the large punches and shears are working under an overload ranging from 35 per cent to 50 per cent; and the load goes from zero to a heavy overload in an instant and is off again in the same time. This tries the strength of the machines severely.

The generator is of the latest pattern. It is so constructed that the armature can be completely uncovered by sliding the pole piece by means of a screw. This makes it easy of access for repairs. The field coil also can be taken out without disturbing the armature. The yoke of the generator is made of special cast iron with ample cross section and the four poles are of cast steel. They are bolted to the yoke by means of two 1½-inch forged and turned tool steel bolts. The armature core and commutator are mounted on a cast iron spider, making these parts self-contained. The shaft can be removed without disturbing any parts of the armature or commutator. The armature core has a ¼-inch opening every 1½-inch of its length, allowing the air to pass through the armature core and around the windings. The compound coils and shunt coils are wound separately, admitting of the removal or renewal of one without disturbing the other.

In two or three cases tools in the main shop are grouped so as to be driven from one motor. A motor suspended from the ceiling drives shafting by which power is communicated to all the tools in the enclosed machine room shown in Fig. 4, as well as the two planers outside of this room, shown in the same view. The motor is of 10 h. p., and in addition to the planers it furnishes power for a milling machine, lathe, two bolt cutters, a monkey drill, two emery wheels and a grindstone.

For the most part the heavy tools of the shop are driven each by its own motor. There are 15 punches, a channel punch and shear, a bevel shear, an angle iron shear, two sets of small rolls for straightening plates, three counter sinks, a cold press, heavy 18-ft. flanging rolls, and a set of 16-ft. bending rolls. The channel punching and shearing machine is built by the Long & Allstatter Co., of Hamilton, O., and was especially constructed for cutting a rectangular slot four inches wide to the full depth of a 3½-inch flange of channel bars, and 6½ inches deep into the web. The slot would thus be 4x6½ inches in the web and 4x3½ inches deep in the flange. Tools are provided also for punching a large hole through the web very close to the flange. The machine was equipped with automatic stop for bringing the slide to rest on the completion of the stroke.

The three counter-sinks referred to above are of an improved type. The machine is suspended from a jib-crane trolley and thus can be moved to any part of a plate, a great advance in convenience over the ordinary arrangement, which is a stationary machine, requiring the laborious moving of the heavy plate numberless times.

LAKE SUPERIOR IRON MINES.

The Walpole mine, at Iron Mountain, Mich., will be a shipper the coming season. The spur track to the Pewabic will be extended to the property. The ore grades about the same as the Genoa of the Pewabic mine.

It is estimated that the Champion mine can produce 160,000 tons of ore this year. Two grades will be put on the market. The Champion No. 1 is 65 in iron and .045 in phosphorus, and the other grade is 56 in iron, with .045 in phosphorus.

The Protection mine on the Menominee range is being put in shape to produce in the coming season. Drifting on the ore vein from the first level has shown ore for 300 feet. Welcome Hyde has secured a lease from the remaining fee owners.

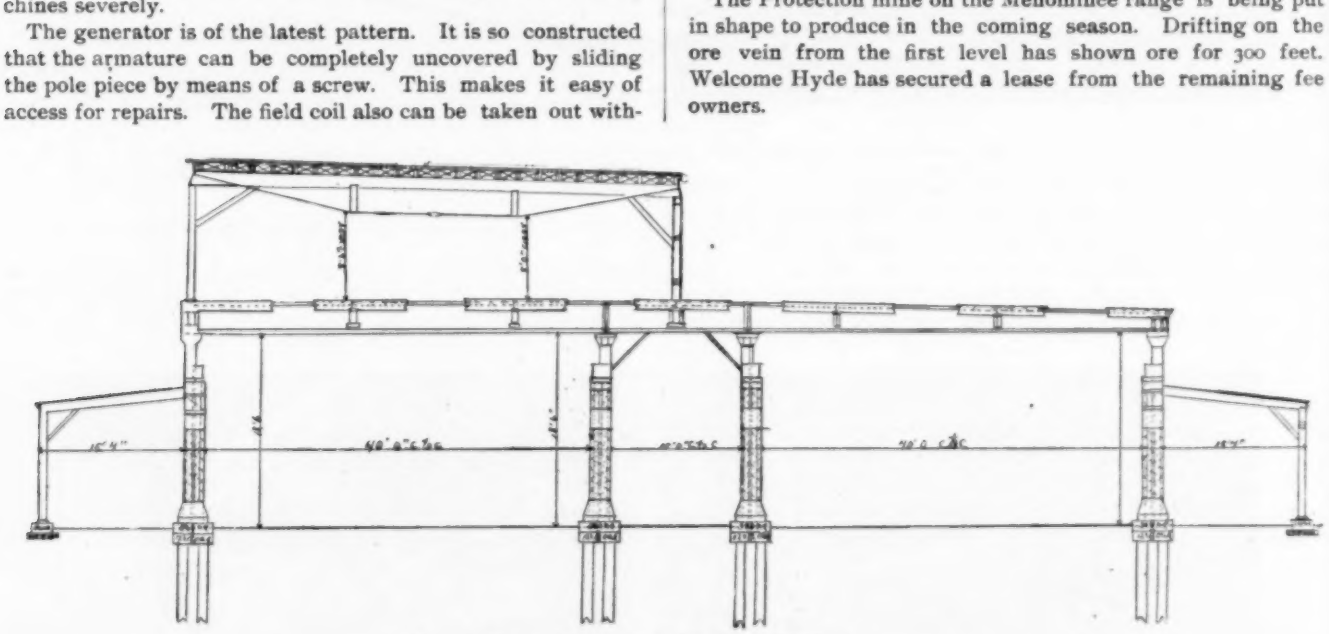


FIG. 5.—MAIN SHOP IN CROSS SECTION.

Nothing has come as yet of the recent proposition of Ferdinand Schlesinger to the Milwaukee Vermilion Iron & Land Co. The company acquired 2,200 acres of land on the Vermilion range in 1888, but there has been little money spent to determine the value of any of the ore deposits.

The Duluth, Missabe & Northern Railroad, with its 138 miles of track, has capital stock of $2,512,500, and the bonded indebtedness is reported at $5,463,946. The gross earnings for the calendar year 1897 were $2,037,937. In the year ending June 30, 1897, covered by the reports submitted to State officials, the gross earnings were $1,586,245; operating expenses, $575,840; interest on funded debt, $286,000; taxes, $31,000; "other deductions," $587,785; apparent net income, $116,181.

The same advances in wages announced at the Norrie and Tilden mines have been made at other Ironwood, Mich., properties.

The Colby Iron Co., of Bessemer, Mich., has filed articles of association with the Secretary of State. The captial stock is $250,000. The company is a reorganization of the old one operating the Colby (Sec. 16) mine at Bessemer.

The Barasa mine at Negaunee, Mich., is looking well, the shaft being down about 175 feet. A new Rand air compressor is being installed.

THE contracts for machinery and supplies needed by the electrical and mechanical engineer of the Pittsburg Department of Public Safety have been awarded the U. Baird Machinery Co., and Somers, Fitler & Clark, of Pittsburg.

Review of the Technical Press.

[Translations, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke.]

Steel Rails, Past and Present.—[*Proceedings of the Western Railway Club*, Jan. 25.]—Mr. E. C. Potter gives some interesting reminiscences of his life-long experience with the development of the steel rail industry in this country. When he opens up with the remark that during his time of service in this arduous work his "feelings were so continually and deeply harrowed up that the memories of those days will only end with life," he touches a responsive chord in the breast of many a man now groaning under the load of responsibilities which continually changing many mean his ruin by a very slight turn of the market. The first steel rail made in America was rolled at the old works of the North Chicago Rolling Mill Co., manufacturing them commercially beginning in 1872. The supremacy of the steel rail over the iron being so marked, almost any kind of a rail was accepted. When, however, the processes of manufacture were cheapened, and the severity of competition sent the price down to the lowest point reached in 1885, rails came into the market which did not stand up in service as well as did those of the earlier days, which were in addition much lighter. Hammered ingots made from partly charcoal iron were formerly used by one mill for making rails of the highest quality, yet when this mill was asked to duplicate them later on it could not be done with rolled ingots of practically the same mixture. This brought out a flood of discussion on hammered versus rolled ingots but no other tangible results. Rail sections are next discussed, Mr. Potter giving much interesting history, beginning with the old John Brown rail which came from Sheffield; then also the contemporaneous studies made by Messrs. Delano and P. H. Dudley, which resulted in rail sections of excellent pattern. Mr. Potter gives the manufacturer's side of the story, showing that his constant aim must naturally be the production of as few "seconds" as possible, and that the rail section which enables him to do this is the one he wants. A comparison and study of rail sections from the standpoint of ease in manufacture would indicate that the best one is that in which there is an equal distribution of the metal in head and flange; this will also give uniformity in the density, and greater chances for good wearing qualities. The adoption of the standards of the American Society of Civil Engineers has been of greatest value in this direction, and as Mr. Potter intimates, if only the minor and often unimportant changes introduced by engineers with a hobby in rail section curves could be obviated, the necessity for continually making odd rolls would disappear. Rail joints come in for their share in the discussion, the solution of this vexed question being as far off as ever. In regard to the chemical composition of rails, Mr. Potter rightly suggests the addition of a little more silicon. This is borne out by the recent tests with high silicon steels, which exhibited remarkable strength. Mr. Potter concludes with a summary of what American ingenuity has done in producing the cheapest finished product in iron and steel manufacture, which is at the same time the most difficult to make.

Interesting Rail Tests.—[*Proceedings of the Western Railway Club*, Jan. 25.]—Mr. F. A. Delano gives some interesting data obtained from a number of rail tests. Samples were taken from five 30-foot rails rolled consecutively from the same ingot, and in such a manner that they represented a location of about 5, 35, 65, 98, and 128 feet from the beginning (top) of what would have been a finished rail 158 feet long. The carbon of the ingot was 0.39. The samples were four feet long in the first place, one foot being cut off afterwards to serve for tensile tests, the other three remaining for the transverse. A very thin slice was also kept for etching. In the transverse tests the knife edge bore down upon the top of the rails, while the bottom rested upon supports 30 inches apart. A number of additional etchings of steel rail sections are shown, all of which are exceedingly interesting. They substantiate the well known fact that the segregation of impurities in the top of the ingot is quite noticeable, incidentally show the existence of a well marked pipe, and in one case an actual split in the top of the rail. The tensile data also show the top rail to be weak. A very extended series of tables is given. That one giving the chemical data is interesting in connection with the variations supposed to exist in different portions of a rail. The carbon of the ingot was supposed to be .39 but the 27 analyses of the rail show it to vary from .46 to .52, which would indicate that the rolling mill determination was slightly off. The difference in the carbon is .06 per cent, half of which is due to the personal equation of the chemist. Phosphorus runs from .089 to .112, which bears out the supposition that phosphorus is very liable to segregate in ingots. The sulphur contents runs from .043 to .062, or about .02 difference, and the manganese from 1.11 to 1.16, which are not very excessive differences, the figures being the extremes of 27 samples.

Standard Specifications for Testing Iron and Steel Products.—[*Baumaterialienkunde*, Nov. 12.]—At the recent Stockholm meeting of the International Society for uniformity in testing materials of construction, the commission appointed to prepare specifications for the testing of iron and steel products made its first progress report. Imperial Councillor Ast, of Vienna, as chairman of this commission, expressed his appreciation of the very general interest taken in the researches made in this line of work. He traces the desire for reagter enlightenment regarding the constitution, quality, the methods of making, and the testing of iron and steel, to the ever-increasing demand for better results and higher standards of requirements. The mere fact that success has attended the effort to unite all those interested to one international body may be taken as a brilliant promise of what is to come of such co-operation. The problem is to settle upon the preparation of the test pieces, the method of testing them, and the specifications of the machinery to be employed. The difficulties presented herewith are so great that a subdivision of the work is essential, and the commission naturally turned to the branch of most importance industrially, that of steel (ingot iron), leaving other divisions of the great subject for later research. Naturally, a study of the specifications now in use was first undertaken, and data compiled which served as a basis for further work. The first step was to sub-divide the subject of testing iron and steel products into two parts. First, finished products to be tested in their entirety, such as axles, car wheels, tires, etc. Second, test pieces cut out of the material before it is manufactured into merchantable shape, the results giving comparative information relative to the value of the finished articles in question. The study and development of the first testing method should be delegated to a sub-commission consisting of railway engineers. In regard to the second line of work, it must be confessed that the results obtained at the present time are entirely disproportionate in value to the time taken and expense incurred. The real cause for dispute between consumer and manufacturer may be traced to the lack of homogeneity in the material, and it is this important factor which has been to some extent neglected, and which must form the basis of the first modification of existing systems of testing. To support this statement an instance is cited, taken from the daily practice of rail maintenance. Rails of which the profiles had been carefully measured and recorded had to be taken up after a service of only 10 or 12 years, being worn out by the passage of 80 46 millions of gross tons over them during this time. This service being very much below the average, an investigation was made to find out the possible cause. A comparison with a lo of rails which gave a maximum of good service was next made. The records of both lots were found to have passed inspection satisfactorily, and stood all the required tests. The rails, moreover, were subjected to the same usage. It would be supposed that tests for tensile strength, surface hardness and chemical analysis, tables of which accompany the paper, would be sufficient for the purpose. This, however, was not the case; in fact the conclusions drawn from the data presented would tend to show that the lot giving the least service was the better. Etching tests were now made, and these located the trouble at once, a remarkable variation in the structure of the poor rails being shown, while the good rails were quite homogeneous. This would prove that tests made on one portion of a finished product are by no means a criterion of the whole. While the etching test is admirably adapted to the preliminary study of a material, it is a rather primitive method, microscopic examination being far better,

but not yet perfected for daily use. Much more is to be learned from impact and tearing tests with nicked bars. Punching tests should also be carried out to obtain information as to shearing, etc. The study now being made in this line of work is to find the limits of variation in the homogeneity of a material to be allowed for construction work.

Strength of Hardened Cast Steel Spheres.—[*Baumaterialienkunde*, Nov. 12.]—Mr. A. Foeppl describes a series of experiments made with hardened cast steel spheres to determine their resistance to crushing. As tests of this kind are not easily carried out, a description of the methods employed will interest us, especially as the rapid introduction of ball bearings in this country has made the whole subject a very live one. It was impossible to crush the spheres between the two flat surfaces of the regular testing apparatus, as no plates could be obtained which were hard enough for the purpose. Tests with the ordinary hardened steel plates would cause more damage to them than to the balls they were supposed to crush. The observations made in a former series of comparative tests of steel balls, that the same materials give comparatively higher results for smaller diameters, was substantiated in this set of tests also. An investigation into the causes for this shows that in reality the plates are tested and not the spheres, for the plates making the contact during the operation are indented to such an extent, that if sufficiently soft a hard steel ball may be embedded entirely. Results thus obtained must naturally be enormous. To overcome this difficulty arrangements were made to test two spheres together, each being embedded carefully in plates bored out for the purpose, so that no damage could result except at the point of contact of the two spheres. This method gave reliable results, for tests made thus gave a compression of 5 to 6 tons, while a ½-inch ball of the same material, placed between hardened steel plates, ran up to 13 tons, and crushed into them one-fifth inch before breaking. The flattening of the balls was also observed one of each pair being blackened before the test was made. By putting on constantly increasing loads, and turning the balls to obtain new contact surfaces, interesting results were obtained. As the spheres tested were not of the exact size prescribed in the standard specifications, current for this work, experiments were made to arrive at comparative data. It was found that the accepted formula according to which the apparent hardness is proportional to the cube root of the radius of curvature gave concordant results. The data could, therefore, easily be recalculated to conform to the standard 1.6-inch diameter sphere. It is to be understood however, that this applies only to the same grade of material. As there is nothing known about the relation of a cylinder to a sphere so far as their crushing strength is concerned, a series of experiments was conducted to supply this hiatus. Cylinders were cut from copper rods, spheres were turned from the same material, and both sets of test pieces thoroughly annealed. The results show that the figures obtained from the compression of spheres are ⅔ of those obtained from testing the corresponding cylinders. An elaborate series of tests of the hardened steel balls follows, the conclusion derived being that the various makes run fairly uniform, varying between 380,000 and 418,000 lbs. crushing strength per sq. in., the average being 396,000 lbs. The highest result ever obtained by the author of the paper was 483,000 for hardened tool steel. When it is remembered that excellent steel rails do not run over 162,000 lbs., hardened steel balls are probably the best material for resisting compression now known. As a consequence, attention should be paid to the beds they rest upon when designing and constructing machinery. A further test was made to ascertain the resistance of these hardened steel balls to impact. Suitable weights were allowed to drop from varying heights upon the balls until they broke. Each test was recorded and from the data obtained the work required to produce fracture was calculated. Finally the resilience of the material showed much greater variations than did the crushing strength under plain compression. In the absence of extended investigation into this subject these tests are certainly of interest.

THE assignment is reported of E. A. Schwartzenberg, a Cleveland dealer in coal and scrap iron. The assets are put at $26,000 and the liabilities at $14,000.

THE WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held at the Great Northern Hotel, Chicago, Wednesday evening, Feb. 16, 1898, President C. A. Sercomb, in the chair.

The following were present: A. H. Blackburn, the Fuel Economizer Co., Matteawan, N. Y.; F. M. Lyon, Burlington Route Foundry, Aurora, Ill.; C. A. Sercomb, Schwab & Sercomb, Milwaukee, Wis.; Jacob Ott, Plano Mfg. Co., West Pullman Ill.; S. T. Johnston, Whiting Foundry Equipment Co., Harvey, Ill.; J. H. Dalton, Walburn-Swenson Co., Chicago Heights, Ill.; Wm. Ferguson, T. Lawrie, Gates Iron Works; A. Sorge, Jr., consulting engineer; Maj. M. McDowell; Eugene Smith, Crane Co.; W. H. Stockham, Stockham Mfg Co; O. T. Stantial, Illinois Malleable Iron Co.; H. K. McLean, R. Ardell and A. M. Thompson, Link Belt Machinery Co.; A. W. Bodell; B. M. Gardner, *The Iron Trade Review;* E. E. R. Fratman, *Engineering News;* H. W. Carter; H. S. Vrooman; Dudley A. Johnson, Jos. Dixon Crucible Co.; C. E. Depuy, C. E. Hoyt, Lewis Institute, all of Chicago.

The application of Thomas Lowrie, of the Gates Iron Works, for membership, was submitted and he was unanimously elected.

The secretary reported from the board of directors recommending that Maj. Malcolm McDowell be made an honorary member and he was duly elected.

The paper of the evening, "Mechanical Changes in the Mixture of Cast Iron," by Eugene W. Smith, was then read by its author. It is as follows:

Changes in Foundry Mixtures.

In the discussion before the Westen Foundrymen's Association in February, 1897, on "What is the proper amount of air, and pressure of same to melt iron in the cupola, and what are the effects of too little or too much air?" The third division of the question was quite thoroughly discussed. The general opinion was that the changes in iron are probably due to mechanical changes. Mr. Dalton attributed hard iron in the first part of the heat to the condition of the cupola. Mr. Pettigrew claimed that the first iron is softer, providing the cupola is dry. If the conditions are constant, why should not the results be the same? Mr. Coffeen supported the theory of open cupola and excessive blast pressure, by his statement that he found it necessary to use softeners in the first part of the heat. Mr. Ferguson advocated using all the blast pressure obtainable, but stated that iron is harder at the beginning of the heat. If the mixture is the same should not the result be attributed to a mechanical condition existing in connection with the cupola?

The deductions obtained at that time by Mr. Carter served to show that the figures given were pretty close as to amount of air required, viz.: Mr. Sorge, 2,500 lbs. of air per ton melted; Mr. Thompson, 3,000 lbs. of air per ton melted; Mr. Hanna, 3,000 lbs. of air per ton melted. Thus we see that the members who were prepared to discuss the amount of air required came very near agreeing.

The members who discussed the effect of blast, practically agreed that there was a difference in the first iron melted, but did not go far enough and find the cause, which the writer thinks might be attributed to some mechanical change, as expressed in this paper.

Mechanical changes which occur in cupola practice often serve to confuse the foundryman who is otherwise very careful as to the charges which he gives to his melter.

Every now and then some one gives a theory to explain why the first iron is harder than the last, and another will give a reason why it is softer. Each demonstrates the matter to his own satisfaction in scientific terms, citing the destruction of silicon, combining of carbon, effect of sulphur, etc., but all this only serves to mystify the ordinary foundryman who has not had the advantage of a college education.

All conditions being equal, results should be the same, no matter at what period of the heat the charge is melted, the differences being due simply to some mechanical change due to handling. Some of these changes the writer will try to

describe in the present paper, showing the absolute care which must be taken in handling to obtain uniform results.

1. A very common source of error occurs in the charging room in weighing up the charges. Sometimes a certain brand of iron is not broken as small as others and the charger is not careful as to balancing his scales, causing variations at different times during the heat.

2. The placing of iron in the cupola in such a manner as to cause uneven melting, allowing one brand to melt and mix ahead of others, frequently causes trouble.

3. Improper drying of the cupola is probably one of the most frequent causes of hard iron in the beginning of the heat, particularly so if the receiving ladle, hand ladles, etc., are not thoroughly dry, or even cold, causing changes in the condition of iron by chilling.

4. Probably the most important cause of change in the first iron melted is the excessive use of blast. The cupola at that time is probably in its very best condition. The fuel resembles an open net-work, somewhat like a sponge, unobstructed by slag, which does not begin to form until considerable iron has been melted. The tuyeres also remain unsealed, and if conditions are otherwise all right, the iron will be exposed to the oxidizing effect of the blast while trickling through the fuel, serving to harden it.

This is generally attributed to a chemical change caused by sulphur in the bed charge of fuel. But there is no good reason why the sulphur should predominate any more in the first charge than later in the heat; or, as is sometimes the case, on one day more than the next, when the same fuel is used. It is also attributed to the destruction of silicon, which is probably the true effect, but not the cause. It is simply a condition which should not exist, as the heat required is no greater at that time than later on. True, it is hard to draw the line by calling it a mechanical change when the carbon has been combined no matter by what cause. Still it may be avoided mechanically, where control of the blast may be had, by reducing the pressure to the lowest point possible without delaying the melting process.

This trouble is met with in all foundries more or less, except where large amounts of iron are carried in the cupola. In such cases the effect of blast would not likely be apparent.

5. Another source of error, caused mechanically, occurs where the iron is drawn off faster than it is melting, not allowing it to mix properly, thus obtaining hard iron at one time and soft at another.

6. A change in condition occurs where the slag-hole is used and the cupola is held too full, allowing the slag to clear off the iron, thus exposing it to the oxidizing effect of the blast.

7. Still another change is caused where the lining of the cupola has been made too hot in drying out, which sets fire to the fuel charges above the melting zone at one side or the other, causing the stock to come down unevenly.

8. Very often the tuyeres are formed unevenly, with larger openings on one side than the other, causing the stock to melt faster on one side, thus giving an uneven result.

Another instance occurs where economy in the use of fuel is practiced. The bed may be all right and heat started successfully, but by the excessive use of blast the bed of fuel is gradually decreased, until at last, when charging is all done and the doors closed, the iron melts too close to the tuyeres, which is almost invariably a cause of hard iron. Soft fuel under the same conditions would likely have the same result. In the above case an excess of thin fluid slag, about the consistency of soap-suds will be noticed, very foamy and light; and if the blast is excessive, the slag will be held up by its pressure around the sides of the cupola, also giving off a peculiar puffing sound very easily noticed. It can not be drawn off until the blast pressure has been reduced, which must be done gradually and carefully, or the slag will flow into the tuyeres first. The hard iron in this case could be attributed to the destruction of the metalloids, nevertheless it is a mechanical change in the mixture which would not have happened if the melting had been done properly.

The above items only apply where the iron melted does not exceed eight tons per hour and the stack does not exceed 48 inches diameter. Neither do they apply to any particular grade of mixture. The effects would probably be the same whether hard or soft irons were melted.

Discussion.

Mr. Smith: One point I wish to raise is, that in our studies of the theoretical we must not lose track of the practical side. The deductions arrived at in this paper are the result of close observation of the workings of the cupola under various conditions. It must not be understood that I infer that the effects are not chemical effects. I simply show that they are caused mechanically. Nor are all of the instances mentioned in which changes might occur. Probably no two foundrymen present are melting iron under the same conditions, either in class of work, size of cupola, or arrangement of tuyeres. Therefore it will be very easy for some of the members to differ with me as to the various causes presented. In some of the points raised my interpretation of the causes may be wrong. In that case, I shall profit by the experience of others. Now in regard to No. 1, that I believe is plain to the members. Referring to No. 2, the proper manner of placing iron in the cupola is similar to the spokes of a wheel as pig iron melts from the ends first and the center of cupola should be the hottest. Where scrap is used, in some places larger pieces are used in excess, and in some places regardless of position in cupola, causing uneven mixtures. A great deal depends in this case upon the man who does the charging and his reliability and intelligence, and as the manner of charging and weighing up is not the same in all foundries, no set rule can be given to cover all cases. The foreman will have to guard these points in his instruction to the melter. Coming to No. 4, governing the blast in the beginning of the heat is very apt to be misunderstood. I do not wish to convey the impression that a light blast is required at all times. But I do contend that the blast should be used as light as possible (without delaying the melting process) at the beginning of the heat, and gradually increased until speed of melting suits the requirements, otherwise the results will not be the same. I understand that a stronger blast would be required with small coke than with large; and the same is true of coal. Where soft coal is used the blast should necessarily be lighter. No. 5 will probably only apply in cases where slow melting is required as in hand ladle practice. No. 8 is not an argument for any particular class of tuyeres, as the results would be the same under like conditions. Since writing No. 9 I recalled a case (and probably some of the foundrymen present have seen the same thing) which I saw a few years ago, of a cupola in which the charging doors had not been closed and the slag had not only been held up by the pressure of the blast in the manner stated, but it had also been blown up to the roof of the charging room. I was not in a position at that time to consider the cause.

Mr. Ott: I would like to inquire about the remark concerning overheating the lining of the cupola.

Mr. Smith: That does occur where the cupola is heated up too high and the bricks become heated in the lining of the cupola. It is where the cupola has been heated red hot and the iron charge is small and the fuel charge is close together.

Mr. Ott: When you speak of the cupola, do you mean the outside or the inside of the lining?

Mr. Smith: I mean the inside.

Mr. Ott: In regard to the hard iron. I have got hold of coke that was full of sulphur. On the first heat the iron would come out hard, but as soon as the cupola was ready for the second heat the iron would come out softer. It must be the sulphur that caused the first iron to be hard. If sulphurous coke is used, we will naturally get the iron harder in the first part of the heat. I am always on the lookout for sulphur in the coke. I understand that some claim that the first iron is softer. I have never found it so, and I have melted iron since 1860. I have never found the first iron the softer unless the fuel was absolutely clear of sulphur. Years ago we used coal altogether. It is easier to melt with coke than coal. I did not notice the difference so much then; perhaps I was not so well posted. I remember having trouble with iron during the first part of the heat. I laid it to the coal and the wet lining of the cupola. Frequently the cupola is daubed up with wet mud.

Mr. Smith: I take the stand that the sulphur in the first part of the heat is a popular fallacy. Mr. Ott states that during the war he used coal. It appears to bear me out in my theory. With coal we know we require a harder blast. It packs closer.

Mr. Ott: I never allow my melters to put a full blast on in the beginning of a heat. If too much blast is put on the body will be lower and the iron too near the tuyeres and you will have hard iron.

Mr. Smith: In regard to the sizes of the iron, Mr. Ott is right. I believe in getting the iron broken up as uniformly as possible. By charging with too large pieces of iron, the iron is very apt to hang between the charges.

Mr. Thompson: It has not been my experience to notice that we have no harder iron in the beginning of the heat than toward the end. In fact, we make it a practice to pour our pulleys and machine work in the first taps. We do that for the reason that in charging up we know just when the charges will melt and know just what kind of iron to expect. We probably put on softer iron in the beginning of the heat. But where, say, a ton of iron is allowed to accumulate in the cupola before tapping up I think the tendency toward hardening the iron which might occur through oxides of iron or a wet bed is overcome in that quantity of iron. I believe that the first hundred pounds of iron melted will have a tendency to harden, but that is so little if we allow a ton to accumulate that the effect will not be felt. I do not know of any case where we ever got hard iron out of the first tap any more than at any other time during the heat. In regard to the amount of air which should be allowed to go into the cupola. Mr. Ott states that when the blast is commenced he does not have so much pressure. It requires a certain amount of air per ton to the iron melted and I do not think that the slowing of the blast at the beginning of the heat would be in any wise beneficial, and that is sometimes very difficult to do. That can only be done when you have a special engine attached to the blower. I do not think that it would be a very practical method in the generality of foundries to use less pressure of blast at the beginning of the heat.

Mr. Smith: In regard to carrying a thousand pounds of iron in the cupola, I would like to call your attention to reverberatory furnace practice. There it is given an excess of top blast if you want to run the iron up, and it is practically the same thing that causes hardening in the cupola, provided you have raised the iron up and cleared the slag off the surface of the iron the same as you would in the reverberatory practice.

Mr. Ferguson: Referring to the classified statement Mr. Smith makes in regard to the handling of the cupola, I take exception to his assertion that there is as much liability to obtaining sulphur in the middle of the heat as there is in the beginning. We will say that in a 40-inch cupola it will take 850 or 900 lbs. of fuel to bring the iron up to the proper height. In subsequent charges it is only a matter of 150 to 175 lbs. The first iron charged in the furnace must necessarily pass through all this body of fuel and there is necessarily more sulphur taken up from 850 or 900 lbs. of fuel than from 150 lbs. That would be the only way of accounting for the iron being harder in the first heat. It has always been a puzzle to me how to get rid of the hard iron. I do not see that we have any data in regard to the degree of hardness. I would like to know the difference in the irons tapped from the first and subsequent heats. I do not think that we can gain much knowledge from the statement that the iron is harder from the first heat. Mr. Smith in his paper charges me with saying that I applied all the blast I could get. In connection with that, he did not tell the whole story. I had found, it seemed to me, that the mechanical men had arranged matters so that it was impossible to get too much blast. I had no way of reducing the blast pressure without reducing the speed of melting. I had never, as I said, had so much blast that I considered it detrimental to the iron.

Mr. Blackburn: Our experience has not been that we got much harder iron on the first heat. I would agree with the last speaker that we would get from the extra amount of coke more sulphur, but we have not found it so in our experience.

Mr. Stantial: Invariably it has been my experience that the first iron out of the cupola is harder than later on. That poured from the first tap is invariably harder and the fracture of lighter color. When it comes to the chemical composition, I have found that the carbon in the first iron is higher than in the later, silicon about the same, usually found higher, sulphur sometimes higher, but oftentimes the same. The reason, I believe, to be the condition of the cupola. The lining is cool, everything is cool as compared with the condition later on during the heat. On the question of blast, I agree with Mr. Smith. I think it should be lighter by several ounces at the start of the heat, and later on, when everything is well and the iron melting, it should be raised. It is my practice for the first 15 or 20 minutes the blast is on to run the blower at a lower speed than later on. In this way I believe I have obtained better results.

Mr. Stockham: I am convinced that all results, detrimental and otherwise, can be governed almost absolutely by the proper proportion of metalloids. As far as my experience goes, it leads me to believe that if we eliminate from consideration the first quarter or half ton of iron that would come out of the cupola, any variation that would occur during the remainder of the heat would be so slight that it would be immaterial for practical purposes.

Mr. Stantial: In regard to the size of the heats I have noticed the same phenomena with heats of 85 tons and heats of, say, 5 tons.

Mr. Stockham: I would like to ask Mr. Stantial a question. Were your test bars taken from the first tap in which would naturally appear the first quarter or half ton of iron?

Mr. Stantial: They were taken from the first ton out of the first charge that comes out of the cupola.

Discussion of Maj. McDowell's Paper.

Maj. McDowell: Before opening the discussion this evening, I want to express to this association my sincere thanks for the honor you have conferred upon me this evening. I will frankly say to you that, although I have occupied a great many places, both social and political, there is nothing that has come so near to me as my election to-night as an honorary member of this association. We are here together for the purpose of building up what I think is one of the grandest professions. I find it impossible to express to you my gratitude for making me an honorary member of such a society.

In regard to the effect of metalloids upon iron I have a table here which I would like to submit:

	A	B	C	D	E	F	G	H	I	K
	Name and kind of metal.	Tens. strength 1 inch area.	Value per ton.	Total carbon.	Silicon.	Phosphrous.	Sulphur	Manganese.	Total amount of iron	Total amount of Metalloids.
1	Swedish charcoal wrought iron	48,000	$52.00	.15	.05	.003	.00	.00	99.797	.203
2	Burden's best wrought iron	56 000	48.00	.04	.016	.167	.00	.00	99.657	.233
3	Common bar iron	48,000	25.00	.07	.14	.10	.02	.00	99.67	.330
4	Bessemer rail steel	64.000	22.00	.35	.034	.10	.05	.85	98.616	1.384
5	Low carbon steel	62 000	30.00	.13	.024	.05	.03	.75	98.9.6	1.004
6	Tool or crucible steel	150.000	200.00	1.50	.10	.005	.00	.10	97.895	2.105
7	No. 1 foundry pig iron	18,000	12.00	3.65	2.80	.75	.01	.30	92.49	7.510
8	No. 2 foundry pig iron	19,000	11.50	3.29	2.25	.70	.02	.40	93. 4	6.66
9	No. 3 foundry pig iron	20,000	11.00	3.25	1.95	.30	.05	.55	94.9	6.10
10	Gray forge iron	18,0 0	10.50	3.80	1.00	.65	.07	.52	94.96	6.04
11	Mottled forge iron	17,000	10.0	3.75	.90	.50	.09	.74	94.02	5.98
12	White forge iron	16 000	9.00	3.65	.40	.25	.23	.80	94.6	5.35
13	Bessemer pig iron	17,000	11.00	3.50	1.50	.05	.03	.35	94.57	5.43
14	Bessemer pig iron for O H.	20,000	11.0	3.25	1.00	.15	.03	.30	95.27	4.73
15	Malleable pig iron	20,000	12.00	4.00	.75	.04	.01	.40	94.80	5.20

This tabulated statement is not perfect nor accurate in all its details, nor is it up to date in price or analysis, but it is harmonious and sufficiently accurate for me to use in illustrating the question now before us. To facilitate following the data, the horizontal lines are numbered, and the vertical columns are lettered.

No. 1, column A, is Swedish, wrought charcoal iron having a tensile strength of 48,000 lbs. per square inch, and a value, Column C, of $52 per ton. The chemical analysis shows total carbon, .15; silicon, .05; phosphorus, .003, and entirely free from sulphur and manganese. In column I the total amount of iron is 99.797, and column K amount of metalloid is .203 showing a very remarkably pure metal. This iron is made direct from ore, and from start to finish the fuel is charcoal. It is made from a peculiar ore, well adapted to this special kind of treatment, requiring very nearly four tons of ore to make one ton of finished bars. The ore is calcined, then washed and sometimes reduced to plate iron from a furnace, but as often the calcined ore is charged direct on a bed of charcoal on an old fashioned sinking fire or Catalan forge, each charge consisting of a bed of charcoal, then plate iron or iron ore, until sufficient charges are made to make a heat.

No. 2 is Burden's Best, which is in this country a typical iron for general usefulness, and is reliable in regard to its tensile strength. It works with great ease and smoothness when hot, under the hammer or in the rolls, and when cold can be riveted solid. In drawing a comparison between it and the line above, Swedish iron, there is a difference in tensile strength of 11,000 lbs. in favor of Burden's Best, but as in column C there is a difference of $4 in favor of Swedish, naturally the inquiry would be, What is it that makes these great differences in physical strength and commercial value? Take column F, line 2, phosphorus 1.67. It is this that bars its use in making crucible tool steel, and it is the same metalloid that gives to it its great tensile strength, and great malleability, and this is on account of its not being embarrassed by the high carbon shown in column D, line 1. The difference in the total amount of metalloids in these two metals as shown in column K is .030, and this is accounted for in the two items of carbon and phosphorus, where one is high and the other is low, and this difference gives to each metal its peculiarities and respective value.

No. 3 is common bar iron and like Burden's Best is puddled. By comparing the one with the other, we find the former carrying, column K, .097 more metalloid than the former, and while this is quite enough to account for the large difference there is in the commercial value and physical strength, it is not altogether due to it, for each employs a puddler at a scale of prices arbitrarily fixed by an association. Burden's Best pays a premium for quality, and quality can only be produced with an intelligent effort during a high heat. Although quality as well as quantity is a consideration, and when a premium is paid for the former, it is an inspiration to produce Burden's Best; where mere tonnage is the consideration, the puddlers' inspiration in working is to leave all the cinder he can incorporate in the puddle ball, and make it stick together, and this is common wrought iron.

No. 4 is Bessemer rail steel. The name is aptly applied; for with a few exceptions Bessemer steel is limited to rails, and is a metal eminently suited for that purpose. It is more a semi-steel than a steel, being too low in carbon to give any of the peculiarities and valuable qualities of steel, and too high to rank with iron, and although it is high in tensile strength, it is cold-short, and therefore, condemned for structure and boiler-plate work.

It seems wonderful that the commercial value of the tensile strength may be influenced by so small a fraction of a metalloid. That is in wrought iron. The same rule holds good as we go along all through the question of the value of metalloids as combined with iron. In the paper that I read the other evening there is a table that is embodied in this which has simply to do with the costs of iron. That shows No. 1 foundry iron 1,800 lbs. tensile strength, at $12 per ton. The total amount of iron is 92.49 but the metalloids are 7.51. That amount of metalloids has got to be eliminated in making steel and wrought iron. When we start in with the crude, coarse metal we have all these to act upon. The question of silicon is always a strong one. The value of pig iron is estimated by the amount of silicon in the metal. This is the commercial value. You put it there because it will carry more scrap and is therefore worth that much more to you. We have this question of metalloids now in addition. We have the question of the commercial value of metalloids as combined with iron in making castings. I hope to-night that you will all feel perfectly free in talking on the subject and that you have given a good deal of thought and consideration to the value of metalloids in making castings in your own personal experiences.

Mr. Ferguson: There is so much to talk about on this subject that I do not know where to begin. I would like to get a key for the starting point. It is some 10 years ago that I first got interested in the properties of iron, and have made it a study more or less ever since, and in that time have had the use of a laboratory in connection with the work and I am only now beginning to know some of the values in connection with the use of metalloids. It is a hard road for the ordinary mechanic to travel to become familiar with the handling of metalloids. There are six or seven points that make all the changes. To me it seems a very delicate proposition to handle to get the desired results at all times. I would speak from my own experience of 10 years of hard work and study, that I am only beginning to learn a little something. Therefore the members that have not had that experience must not become discouraged if they do not get the results that they are aiming at. It takes hard, close application; and you cannot let go, you have to keep at it all the time.

The secretary read from *The Iron Trade Review* of Feb. 10, the communication of Guy R. Johnson, of Embreville, Tenn., bearing on Maj. McDowell's paper.

Maj. McDowell: In reply to Mr. Johnson, let me say: Cast iron is what it is, because of the amount of carbon it contains, and the relation of the carbon to the iron, whether combined or uncombined, and the action of the two metals, silicon and manganese, and the two metalloids, phosphorus and sulphur, that affect these relations. A casting whose combined carbon is very nearly one-third of the total amount of carbon and two-thirds uncombined and these relations unembarrassed by the presence of phosphorus and sulphur, gives as strong a casting as can be made out of this grade of metal used. To demonstrate the truth of this I call your attention to the following statement of two heats of metal:

	Combined carbon.	Graphitic carbon.	Total carbon.	Combined carbon.	Silicon.	Phos.	Sulphur.	Mang.	Tensile strength.
Embreville iron	.92	2.84	3.76	25%	1.29	.17	.05	.80	36,000
McDowell semi steel	.93	2.19	3.12	33%	1.34	.08	.03	1.00	49,900

When in a casting phosphorus is held below .20 and sulphur .05, their influence on high silicon castings is hardly perceptible; but when silicon goes below 1.40 an increase in the amount of these metalloids is marked, not always so much in strength of the casting but its ductility, malleability and elasticity, qualities as desirable as strength. Had Mr. Johnson's metal carried 1.00 or over of manganese instead of .80 it would have increased the amount of combined carbon from .92 to 1.25 and his casting would have been proportionately stronger. Was this casting made from Embreville pig iron melted in a cupola or was it pig iron cast direct from a blast furnace?

When graphitic carbon makes itself manifest in an open grain fracture of dark color in pig iron, it is considered as evidence of the presence of silicon and is graded according to the fracture, No. 1 or No. 2 soft or No. 1 or No. 2 foundry and when the fracture shows combined carbon or a close grained bright fracture, it is graded as No. 3 or No. 4 foundry. In each of these cases the pig iron is sold according to the fracture, but its value to the foundryman depends upon its constituent elements and it is immaterial to him how hot Mr. Johnson's blast furnace was that produced "graphitic iron." It may assist him in grading his output by fracture but its value to the foundryman depends entirely on chemical analysis, not whether the fracture showed graphitic or combined carbon.

[In the latter portion of his remarks, Maj. McDowell referred to a recent communication of Alex. E. Outerbridge, Jr., raising the question whether manganese is a metalloid. He said that for 20 years he had considered manganese a metal, but so uniformly had it been spoken of as a metalloid —and silicon as well—in foundry discussions that he had treated it indifferently. However, he thanked Mr. Outerbridge for calling attention to the matter, and emphasizing the correct classification, making both manganese and silicon metals.]

On motion, a vote of thanks was tendered Mr. Smith for his very able paper.

The secretary reported that an invitation had been extended to the association to hold its autumn meeting in Milwaukee, and by the direction of the board of directors, the president appointed the following committee to consider the matter: S. T. Johnston, B. M. Gardner, and H. S. Vrooman.

THE Lorain Foundry Co., Lorain, O., is now occupied to almost its full capacity, having 130 men at work. The output represents all the lines in which the company works—chilled rolls, ingot molds, machinery castings, employing both reverberatory furnace and cupola. On several occasions recently 60 tons of metal was melted in a day. Some heavy sugar refinery castings are now in the foundry—centrifugals, condensers, etc.

DUPLEX COMPOUND AIR COMPRESSOR.

A new type of air compressor has been introduced by the Ingersoll-Sergeant Drill Co. The frame is of the modified Tangye pattern and bolted to a cast iron base common to both engines. The air cylinders are tandem to the steam cylinders and bolted to the same base, thus making a self-contained duplex compressor of a very compact type. The bearings form an integral part of the tangye frame and are firmly bolted to the bed-plate; they are of ample size and babbitted. The crosshead is of cast iron with phosphor bronze shoes so arranged for taking up wear. The connecting rods are of forged iron of the marine rod pattern on crank and solid end on crosshead, with bronze boxes. The crank shaft is of the best hammered steel with disc crank at each end. Each compressor is provided with one square rim turned fly-wheel of ample size and weight for the duty to be performed, hub bored and keyseated to fit shaft.

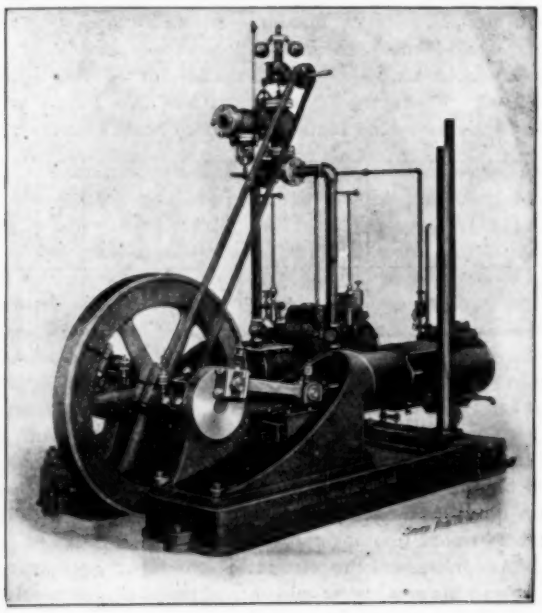


FIG. 1.—COMPOUND CLASS H STEAM-DRIVEN AIR COMPRESSOR.

The steam cylinders have plain slide valves except in the larger sizes, which are operated by Meyer cut-off valve gears.

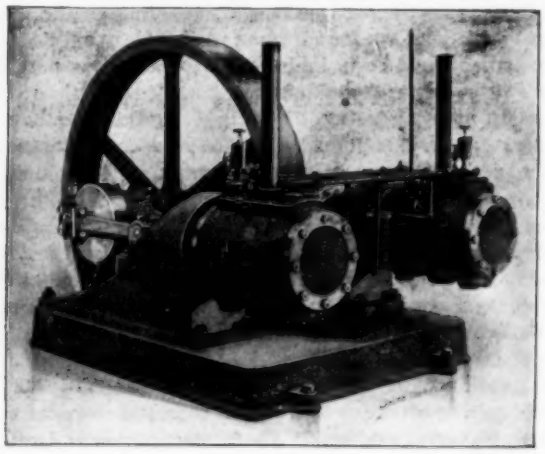


FIG. 2.—DUPLEX CLASS J SIMPLE AIR CYLINDER, BELT DRIVEN COMPRESSOR.

The air cylinders are provided with a very simple form of vertical lift inlet and discharge valves. The air cylinders and heads are provided with water jackets and a suitable pipe intercooler is placed in the bedplate and connected to both air cylinders so that the air in passing from the low pressure to the high pressure air cylinder is thoroughly cooled. Automatic sight feed lubricators are provided for all cylinders. An efficient governing device is also provided to regulate the speed and pressure of the machine.

This machine is built in 20 different sizes, embracing both the compound and simple type. Sizes of air cylinders range from 6 in. x 6 in. to 18 in. x 12 in., with capacities of from 50 to 1,050 feet of free air per minute, and made in proportions to compress from 10 to 125 pounds per square inch.

The company has also adopted this type for a belt driven machine, called "Class J," wherein the fly wheel is replaced by a pulley; the air cylinders are attached directly to the frame.

The belted machine is built with the same variations of simple and cross-compound air cylinders, having the same sizes and capacities as the steam driven machine. The belt machine is adapted for shops and other places where power is already at hand and connection can best be made to existing countershafts. The Ingersoll-Sergeant Co. is well filled with orders for these machines.

CONDITION OF BLAST FURNACES OF U. S.*

Feb. 1, 1898.

Location of Furnaces.	Coke and Anthracite.					Charcoal.				
	Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.	
		Number.	Weekly capacity.	Number.	Weekly capacity.		Number.	Weekly capacity.	Number.	Weekly capacity.
New York	18	3	4568	15	8017	5	1	100	4	448
New Jersey	5	2	1538	3	1327	.....	.....	.....	.....	.....
Spiegel	3	2	476	1	100	.....	.....	.....	.....	.....
Pennsylvania:						13	0	0	13	750
Lehigh Valley	37	9	4389	28	12580	.....	.....	.....	.....	.....
Spiegel	1	0	0	1	100	.....	.....	.....	.....	.....
Schuylkill Valley	17	7	5314	10	5539	.....	.....	.....	.....	.....
Upper Susqu. Val.	5	2	2020	3	1780	.....	.....	.....	.....	.....
Lower Susqu. Val.	10	6	6683	4	1392	.....	.....	.....	.....	.....
Spiegel	1	1	490	0	0	.....	.....	.....	.....	.....
Lebanon Valley	12	7	4826	5	2183	.....	.....	.....	.....	.....
Pittsburgh	28	27	56226	1	2800	.....	.....	.....	.....	.....
Spiegel	2	2	1564	0	0	.....	.....	.....	.....	.....
Shenango Valley	17	11	16837	6	3260	.....	.....	.....	.....	.....
Jun. and Con. Vals.	14	5	7124	9	4969	.....	.....	.....	.....	.....
Spiegel	1	1	809	0	0	.....	.....	.....	.....	.....
Youghiogheny Val.	3	1	1312	2	1900	.....	.....	.....	.....	.....
Miscellaneous	5	1	1396	4	2889	.....	.....	.....	.....	.....
Maryland	5	2	3750	3	3870	4	0	0	4	574
Wheeling District	9	9	11882	0	0	.....	.....	.....	.....	.....
Ohio:						9	0	0	9	730
Mahoning Valley	11	10	14870	1	690	.....	.....	.....	.....	.....
Central & Northern	11	10	14143	1	1165	.....	.....	.....	.....	.....
Hocking Valley	2	0	0	2	850	.....	.....	.....	.....	.....
Hanging Rock	12	7	2300	5	1310	.....	.....	.....	.....	.....
Indiana	1	0	0	1	130	.....	.....	.....	.....	.....
Illinois	16	14	24747	2	1975	.....	.....	.....	.....	.....
Spiegel	1	1	1100	0	0	.....	.....	.....	.....	.....
Minnesota	1	0	0	1	629	.....	.....	.....	.....	.....
Wisconsin	4	3	3011	1	770	2	1	744	1	120
Missouri	3	1	693	2	700	1	0	0	1	375
Colorado	3	1	781	2	3620	.....	.....	.....	.....	.....
Virginia	21	8	5206	13	8564	4	0	0	4	437
Kentucky	6	4	1869	2	1450	3	0	0	3	200
Alabama	32	18	19453	24	14067	12	2	648	10	2350
Michigan	.....	.....	.....	.....	.....	15	6	2605	9	3410
Tennessee	13	5	4227	8	4109	9	1	292	8	2420
Georgia	2	0	0	2	960	3	1	185	2	360
North Carolina	2	0	0	2	600	.....	.....	.....	.....	.....
New England	.....	.....	.....	.....	.....	11	2	160	9	858
Texas	.....	.....	.....	.....	.....	4	0	0	4	970
Utah	.....	.....	.....	.....	.....	1	0	0	1	175
Oregon	.....	.....	.....	.....	.....	1	0	0	1	275
Totals	334	170	223604	164	94295	97	14	4734	83	14352

SUMMARY.

Fuel.	In Blast.						Out of Blast.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	14	16	18	4,734	5,443	5,144	83	81	14,352	13,717
Coke and Anthracite	170	172	136	223,604	221,166	157,815	164	172	94,295	100,043
Total	184	188	154	228,338	226,608	162,959	247	253	108,647	113,760

*The above table is condensed from the *Iron Age*. The tables of the *American Manufacturer* show in blast Feb. 1, 194 furnaces, with 229,823 tons weekly capacity instead of 228,338 as above.

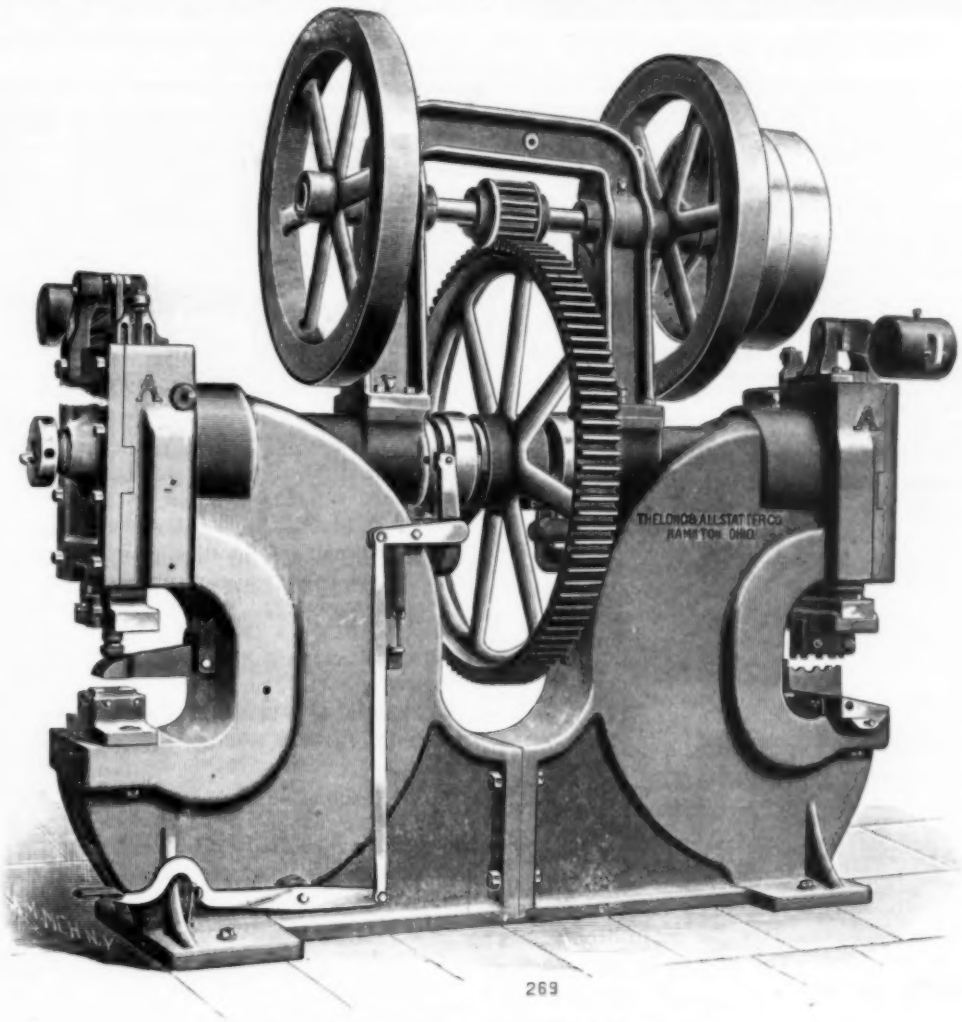
THE Embreville Furnace, at Embreville, Tenn., is to be relined and improved. There is no truth in the report that a new furnace will be built.

THE Eureka Cast Steel Co.'s plant at Chester, Pa., has been ordered sold. It must bring at least $21,000, the amount of the first mortgage.

DOUBLE PUNCHING AND SHEARING MACHINE.

The machine shown in the accompanying illustration is designed for general punching and shearing. Both sides may be used for punching or shearing, according to the tools with which the machine is fitted; but the general advantage of a double machine is that one side may always be ready for shearing, while the other side is devoted to punching. Each side is independent of its fellow, and either side may be operated while the other is at rest. The machine is driven by steel cam-shafts—and these shafts may be turned by hand by an arrangement provided at the front, to facilitate setting the tools. The slides and lower jaw are so constructed that the tools are readily removed and attached with little loss of time. The stripper is of convenient form and quickly removable.

Tools for different kinds of work—punching one hole at a time, punching two or more holes at a time, punching holes and cutting off the ends of bars at one operation—for any work required in punching or shearing, can be readily attached. This machine is accurate and regular in its work, operates easily and simply, and is strong and durable. Machines for special operations of punching and shearing represent an extended line of mechanisms, and the one here illustrated is a type of the great advance that skill and a careful study of newly occurring needs of the modern shop have accomplished. The Long & Allstatter Co., Hamilton, O., are the manufacturers.



DOUBLE PUNCHING AND SHEARING MACHINE.

THE Playford Stoker Co., Cleveland, whose new traveling grate and ash conveyor were illustrated in our issue of the 17th inst., has received an order for two Playford stokers from the Peet Bros. Mfg. Co., of Kansas City, Mo., for standard boilers of 360 h. p. each. The Northeast Electric Railway Co., of Kansas City, has ordered Playford stokers for two B. & W. boilers of 150 h. p. each. These orders make six stokers that have been installed in important Kansas City plants. The Castalia (O.) Portland Cement Co. will install three stokers and the Telephone Bldg., Cleveland, has placed a contract for two additional Playford stokers.

THE TIN PLATE MARKET.

The past week has been a fairly active one with a good demand for plates for early deliveries and a slightly firmer market for deliveries this side of July. Buyers do not seem to have much confidence in the market's present strength because the quotations for the last half of the year are lower by 5c to 7½c and sellers seem anxious to contract late deliveries. The large can-makers are well supplied with orders and the consumption of tin plate in this branch of the business bids fair to exceed that of previous years. As previously mentioned, there may be an actual shortage in coke tins before the canning season is finished. A number of large orders have been booked during the week for deliveries April to September and as a result the mills are generally more independent than at any time for six months. We quote as follows f. o. b. Pittsburg or Indiana districts for deliveries April to September:

CHARCOAL TINS.

	IC	IX
Lisvane Grade,	$3.45	$4.20
Calland Grade,	3.65	4.35

COKE TINS.

IC, 108 lb. Basis weight,	$2.95
100 lb. " "	2.80
95 lb. " "	2.70
90 lb. " "	2.75
85 lb. " "	2.60
80 lb. " "	2.60

TERNE PLATES.

IC, 216 lb., 20 x 29	$5.85
200 lb. "	5.55

For March deliveries a premium of 2½c to 5c per box has been paid over above prices. There is nothing new in the combination plans and the trade takes little interest in the matter.

IT is reported unofficially that the New Castle Steel & Tin Plate Co. will add 10 new mills to its present plant at New Castle. There are 20 mills at present.

COCHRANE HEATERS

2-2300 H. P. Cochrane Heaters and Purifiers built for Shenango Valley Steel Co.

Cutting Down the Cost of Production.

We are all interested in that—we buy automatic cut-off, compound condensing or other expensive engines instead of the old slide valve just because they will do more work with the same or less fuel. We put in economizers, stokers or other things to obtain the same end. But not all of us are on to the fact that in the majority of plants a larger saving can be made by putting in the right sort of the feed water heater—a COCHRANE FEED WATER HEATER AND PURIFIER.

It's true. Some heaters give a temperature of only 150° or 160° to the feed-water—the "COCHRANE" will give from 208° to 210° without back pressure, and the saving is just one per cent. of the total fuel bill for every 10° of difference! That is, if your boilers are getting water at 150° you can run your plant, by installing a "Cochrane" with six per cent. less coal, and keep your boilers far cleaner than they are at present—without deterioration from age, oil or scale, and without leakage troubles in your heater.

Harrison Safety Boiler Works,
PHILADELPHIA, PA., MFR'S.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Carpenter Automatic Valve Co. has been incorporated to manufacture and sell safety devices for steam boilers, with a capital stock of $250,000, by W. C. Bullitt and Wm. Morris, of Philadelphia; John Tuohy, of Norfolk, Va., and Alexander Dreer, of Camden, N. J.

Tioga Foundry Co., of Philadelphia, has been incorporated with a capital of $25,000. The incorporators are Samuel A. Kensil, Lewis T. Matlack, Walter L. Taylor, Jacob B. Blankley, Helen B. Way.

The Woodson Steel Co., of Pittsburg has been incorporated with a capital stock of $1,000, by Richard G. Wood, John F. Dantt, Alan W. Wood, D. L. Browne and Persifor F. Smith. The Woodson Land Co., of Pittsburg, has been incorporated with a capital stock of $1,000. The incorporators are the same as those in the Woodson Steel Co.

Collins Co., Pennsboro, W. Va., is in the market for a 48-inch exhaust fan.

George R. Dunn, Wytheville, Va., wants a good steam pump, with engine and boiler; also 20-h. p. boiler and 20-h. p. engine in connection with washing plant; second-hand will do.

The Dessau Co., 37 Maiden Lane, New York, wants to buy a winze hoist, 4x6, double engines; also hoisting engine, 8x10.

In the mechanical department building to be erected at the University of Tennessee, Knoxville, Tenn., a small iron and brass foundry will be equipped. The university will buy foundry outfit, also engine and boiler.

New Construction:—

Plans have been prepared by F. Messmer & Son, architects, Pabst Bldg., Milwaukee, for a machine shop for the Prinz & Rau Mfg. Co., of that city. It is to be of brick, three stories high, lighted by electricity.

M. C. Henry & Co., of New York City, are enlarging their plant and making some extensive improvements. Their new steel stone shed, which is about 50 ft. wide, is to be extended about 70 ft. in length. The metal work, which consists of the steel framework of the building, the covering upon the roof and sides, and the metal runway for traveling crane, is being furnished and erected by the Berlin Iron Bridge Co., of East Berlin, Conn.

At Louisville, Ky., plans are being prepared for finishing shops for the National Foundry & Machine Co.

John Guthridge and J. F. Findlay are negotiating with the Wellsville, O., board of trade for the location of an iron working plant there

It is reported that the McCosh Steel Co., of Burlington, Iowa, will establish at Ferrodale, Henderson Co., Ill., a plant for the manufacture of wire rods, wire nails, and barbed wire.

The Detroit Wire & Iron Co., Detroit, is building a two-story manufactory, 35x125 feet. A gas engine of 10 to 20 h. p. will be purchased.

The reorganization of the Union Steel Co., St. Louis, which has a Bessemer steel plant with puddling and sheet rolling departments at Alexandria, Ind., is still being worked upon.

A pattern and machine shop of steel construction is being erected by the Robinson-Rea Mfg. Co., Pittsburg.

Additions, Enlargements, Removals, Etc.:—

At Charlotte, N. C., the D. A. Tompkins Co. is erecting an extensive addition to its foundry. New equipment will be needed.

The report that the Ashland Steel Co., Ashland, Ky., will add a rod mill to its plant is revived. When this project is carried out, it is well known that two related nail interests at Ironton, O., will take part in it also.

Farrar & Trefits, proprietors of the East Buffalo (N. Y.) Iron Works, will enlarge their plant. A new building is to be erected, a 25-ton traveling crane is to be put in and other improvements made. The building will be of steel, 80x120 feet.

An addition, 40x100 feet, will be made to the Joliet (Ill.) Bridge & Iron Co.'s plant.

Three additional basic open-hearth furnaces will be installed by the Birmingham Rolling Mills, making the capacity 300 tons a day, instead of 120 tons.

The St. Louis (Mo.) Car Co. will erect additional buildings on its new property at North St. Louis, and will move its entire plant to the new location about Aug. 1. A paint shop and machine and blacksmith shops are among the new buildings.

Soho Furnace at Pittsburg, now operated by Laughlin & Co., averaged over 300 tons a day in January.

Fires and Accidents:—

The Ontario Rolling Mills, Hamilton, Ont., were partly destroyed by fire Feb. 14. The loss is $35,000; insured in part.

General Industrial Notes:—

Coe, Powers & Co., of Cleveland, have leased the plant of the Kellog Weldless Tube Co., Findlay, O. The company is composed of Henry L. Coe, E. C. Powers, B. F. Powers, and Geo. E. Needham, of Cleveland, the two last named being connected with the Garry Iron Roofing Co. The Findlay plant will turn out hot-rolled seamless steel tubing of 1½ to 8 inches, outside diameter, and ⅛ to 1¼ inches thick. Steel castings will also be made.

In the case of the Vega Iron Co. against the Pittsburg Steel & Iron Co., Pittsburg, the U. S. Circuit Court made an order permitting the J. C. McNeil Co. to proceed on a lien to secure payment for boilers installed at defendant's furnace.

Julian Kennedy, of Pittsburg, has taken a contract to equip one of the Cambria Iron Co.'s furnaces, Johnstown, Pa., with charging apparatus of new design.

In connection with the project of the Snow & Ice Transportation Co. to run a locomotive over the snow and ice fields to the Klondike, it is stated that some of these locomotives have been successfully operated in lumber camps. The Sargent Co., of Chicago, furnished the steel castings and gears for

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick

GOVERNMENT ⁑ STANDARD.

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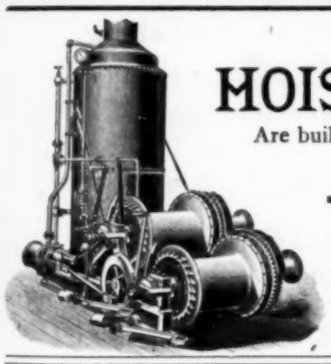
MONTREAL, J. G. Sibbald, 3 Windsor Hotel.
SAN FRANCISCO, John Woodlock, 26 Beale St.



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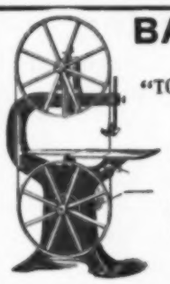

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Belt Power and Foot Power.

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No. 4 Front Street.

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the Klondike order, there being something over a carload, and the company secured this order by its ability to make prompt delivery.

The Pennsylvania Steel Co. has received an order for 12,000 tons of steel rails from the Metropolitan Co., New York.

The Bellaire Steel Co. has reelected its old board of directors as follows: J. R. McCortney, E. W. Oglebay, James Wilson, Charles W. Brockunier, A. B. Carter, J. A. Gallaher and Fred Seabright.

Car and locomotive building: The Ensign Car & Mfg. Co., Huntington, W. Va., with the last order it closed—500 cars for the Southern Pacific—has orders ahead for 2,000 cars. The Chicago, Lake Shore & Eastern will order 250 freight cars, possibly 500. The Wells & French Co., Chicago, will build 100 tank cars for the Glucose Sugar Refining Co., Chicago. The Lake Superior & Ishpeming Railroad has ordered 40 steel cars, 100,000 lbs. capacity, from the Schoen Pressed Steel Co. The Ohio Falls Car Co. will build 200 coal cars and the Missouri Car & Fdy. Co., 300 box cars for the Louisville, Evansville & St. Louis. The Baldwin Locomotive Works have completed 22 locomotives for the Finland State Railway. The same concern has an order for four 10-wheel freight locomotives from the Southern Indiana and 9 freight and 6 passenger locomotives from the Philadephia & Reading. The Indiana & Illinois Southern will buy locomotives.

The Ohio River Sheet & Tin Plate Co., of Remington, Pa., has elected the following officers: President, Alex. Saulters; vice-president, W. J. Caskey; secretary and treasurer, A. G. C. Rhodes; directors, Alex. Saulters, Thos. P. McDonough, M. Rook, Geo. Wood and Jesse Delo.

The Whiting Foundry Equipment Co., Harvey, Ill., has completed arrangements to be the sole manufacturer and sales agent for the Avery molding machine. It is stated that this machine is adapted for all foundry work where parts are duplicated in large numbers, and especially at plow, stove and sash-weight works. Sales of the Whiting cupola have been made to the following recently: Niles Tool Works, Hamilton, O.; Edward P. Allis Co., Milwaukee, Wis.; Griffin Car Wheel Co., Chicago; Hooven, Owen & Rentschler, Co., Hamilton, O.

J. Weideman Murray, Pittsburg representative of the E. P. Allis Co., of Milwaukee, has secured the contract for the blowing engines to be installed at the new Edith furnace, Allegheny. The stack will be 100 feet high, and will have a capacity of 500 tons per day. The present furnace will be kept running until the new one is completed, when it will be used as a dust collector for the new furnace.

Fraser & Chalmers, Chicago, Ill., call attention to the duty perfomance of the Riedler pump built by them for the Chapin Mining Co., Iron Mountain, Mich. The pump is a triplex differential Riedler, with plungers 6⅞ inches and 9⅝ inches diameter and 30-inch stroke, driven by a horizontal triplex tandem-compound-condensing Corliss engine, with steam cylinders 22 and 36 inches diameter and 30 inches stroke; capacity, 2,200 U. S. gallons, against a total head of 1,700 feet, when running about 74 revolutions a minute. It is designed to run economically with steam pressure of 110 pounds a square inch, or by compressed air with a pressure of 60 pounds a square inch at engine. For this reason the engine is equipped with the latest improved form of full-stroke Corliss valve gear and is claimed to be the largest underground pumping engine in the world. At present it is working on the 1,310-foot level, but later will be lowered to the 1,700-foot level.

H. A. Beckley & Co., Garwood, N. J., have just shipped 115

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Good second-hand tubes bought.

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Patent Gap Shears.

General Purpose Punch and Shear—seven sizes.
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Tools for Boiler Shops, Machine Shops and general iron manufacturing industries.

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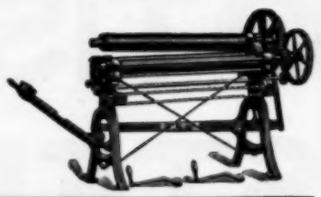

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SEND FOR IT

placer screens to the Klondike, and are now building 400 more for the same place. The company has a large number of contracts on hand for sand-washing screens. All kinds of screens are made by this company.

The Pennsylvania Steel Co. is now employing 1,172 more men than at this time a year ago. These employes are making full time and many of them extra time, whereas a year ago they only averaged three full days a week.

The old Barnhill boiler plant, at Bellaire, O., has been purchased by Messrs. Stanton and Kirk, who will occupy the old works for the manufacture of their hot air furnaces. The work of placing the factory in proper shape for business will be commenced as soon as possible.

The Oliver & Snyder Steel Co., of Pittsburg, will erect an entirely new blast furnace adjacent to the present Edith furnace in Allegheny, Pa. The new furnace will be 100 ft. high 21 ft. at the bosh, and will be equipped with 16 tuyeres. A number of new devices will be introduced, including a new design of skip said to be much in advance of anything yet in use for feeding furnaces. The new stack will be thoroughly modern throughout, and is expected to turn out 500 tons of metal a day when completed. It is proposed to use the present Edith furnace as a dust catcher for the new stack.

Part of the plant of the Laconia Car Co., Laconia, N. H., has resumed work after a shut down of over a year.

The Ferracute Machine Co., of Bridgeton, N. J., has gradually increased its force, has recently enlarged its works, and is now employing about 130 hands. The company shipped a short time ago a press weighing 37,000 lbs., and which was about 8 feet long by 5 feet wide by 10 feet high. It was used with special dies for forming up conveyor troughs. The Ferracute Co. has equipped its die shops with the most recent and improved machines, and has a large force of skilled workmen. It has just issued a large sheet or poster, illustrating a number of presses, which it is mailing to all parts of the world.

The Atlantic Iron & Steel Co., at New Castle, Pa., under the reorganized company resumed operations last week.

The Findlay (O.) Rolling Mill Co.'s assignee, M. B. Gary, has sold the plant to the National Bank of Commerce, of Cleveland, for $10,600, the bank having an attachment for an amount in excess of this price. Negotiations are pending between the bank and Youngstown, O., iron manufacturers for the purchase of the plant.

The closing of the Maryland Steel Co.'s plant at Sparrow's Point, Md., including rail mill, is reported, but the shut-down is not expected to be for a long time.

The Russian Government is reported to have ordered 14 additional locomotives from the Baldwin Locomotive Works.

The contract for the shipment of 4,000 tons of cast iron pipe to Genoa has been placed in the United States.

Levie Bros., of Brussels, Belgium, have just ordered an equipment of Brightman mechanical stokers from the Brightman Furnace Co., of Cleveland.

The Virginia Bridge Co., whose officers are in Charleston, W. Va., assigned last week. Liabilities are $50,000 and assets $15,000.

A co-operative rolling mill project is talked of by a number of Muncie, Ind., iron and steel workers. New equipment is part of the plan. One idle plant at Muncie is available but it is not certain that this will be taken.

When the new equipment of the Bellaire (O.) Steel Co. works smoothly it is expected that 750 to 800 tons a day can be produced. The crane service and other equipment are entirely modern.

THE first shipment of American pig iron to Sweden has just been unloaded at Gothenburg.